SOUTHERN MAINE COASTAL BASIN

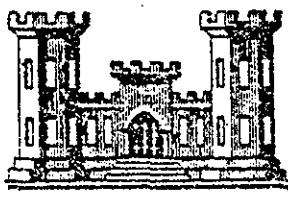
YORK, MAINE

CHASES POND DAM

ME 00188

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

APRIL 1980

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York Maine
Cape Neddick River

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is about 645 ft. long with a height of about 20 ft. The dam is in fair condition.There were no conditions which would warrent urgent remedial action. The size classification is intermediate with a significant hazard potential. In the event of failure of the dam ther would be an extent of downstream development that would be affected.

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SOUTHERN MAINE COASTAL BASIN
YORK, MAINE

[CHASES POND DAM, York ...]
ME 00188

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

APRIL 1980

NATIONAL DAM INSPECTION PROGRAM
PHASE I INVESTIGATION REPORT

Identification No.:	ME 00188
Name of Dam:	Chases Pond
Town:	York
County and State:	York, Maine
Stream:	Cape Neddick River
Date of Site Visit:	15 November 1979

BRIEF ASSESSMENT

Chases Pond Dam consists of a concrete spillway/gate structure with adjacent concrete walls backfilled on the upstream side, and earth embankments at either end. The crest length of the dam is about 645 ft. in a curved alignment. The height of the dam is approximately 20 ft. The reservoir level of Chases Pond was raised by a reconstruction of the facility in 1950. As part of the reconstruction an approximately 500-ft. long earth dike was constructed at a low area along the reservoir, approximately 1,300 ft. southwest of the dam site. The dam serves as a water supply dam for the Town of York, Maine.

Due to the extent of downstream development that would be affected in the event the dam were to fail, Chases Pond Dam has been determined to have a "significant" hazard potential classification in accordance with Corps of Engineers guidelines.

The dam is in fair condition, based on a visual examination of the structure. Although several deficiencies were noted, there was no evidence of settlement, lateral movement or other signs of structural failure, or conditions which would warrant urgent remedial action.

Based on the "intermediate" size and "significant" hazard potential classifications, in accordance with the Corps of Engineers guidelines, the adopted test flood for this dam is 1/2 the Probable Maximum Flood (1/2 PMF). With the water level at the top of dam, the spillway capacity is approximately 1,600 cfs. Hydraulic analyses indicate that the routed test flood outflow of 1,100 cfs (inflow 1,750 cfs or 425 csm) can be passed with a freeboard of about 1.0 ft. and with an unused surcharge-storage of about 200 acre-ft. remaining.

York Water District, owner of the dam, should engage a registered professional engineer qualified in the design and construction of dams to investigate the structural stability of the second cantilever wall panel to the right of the spillway and

the depth of surface deterioration of concrete elements as outlined in Section 7.2. Any necessary modifications resulting from the investigations, and remedial measures, including extending the area of riprap adjacent to the spillway, monitoring the area of the 1979 excavation, filling the depression downstream of the left gravity wall and rebuilding the failed portions of the upstream near-vertical dry laid stone wall, as outlined in Section 7.3, should be implemented by the Owner within one year after receipt of this report. The Owner should also prepare a formal operations and maintenance manual for the dam and establish an emergency preparedness plan and downstream warning system.

HALEY & ALDRICH, INC.
by:

Harl Aldrich
President

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the office of Chief of Engineers, Washington, DC 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions will be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm run-off), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential. Consideration of downstream flooding other than in the event of a dam failure is beyond the scope of this investigation.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be

needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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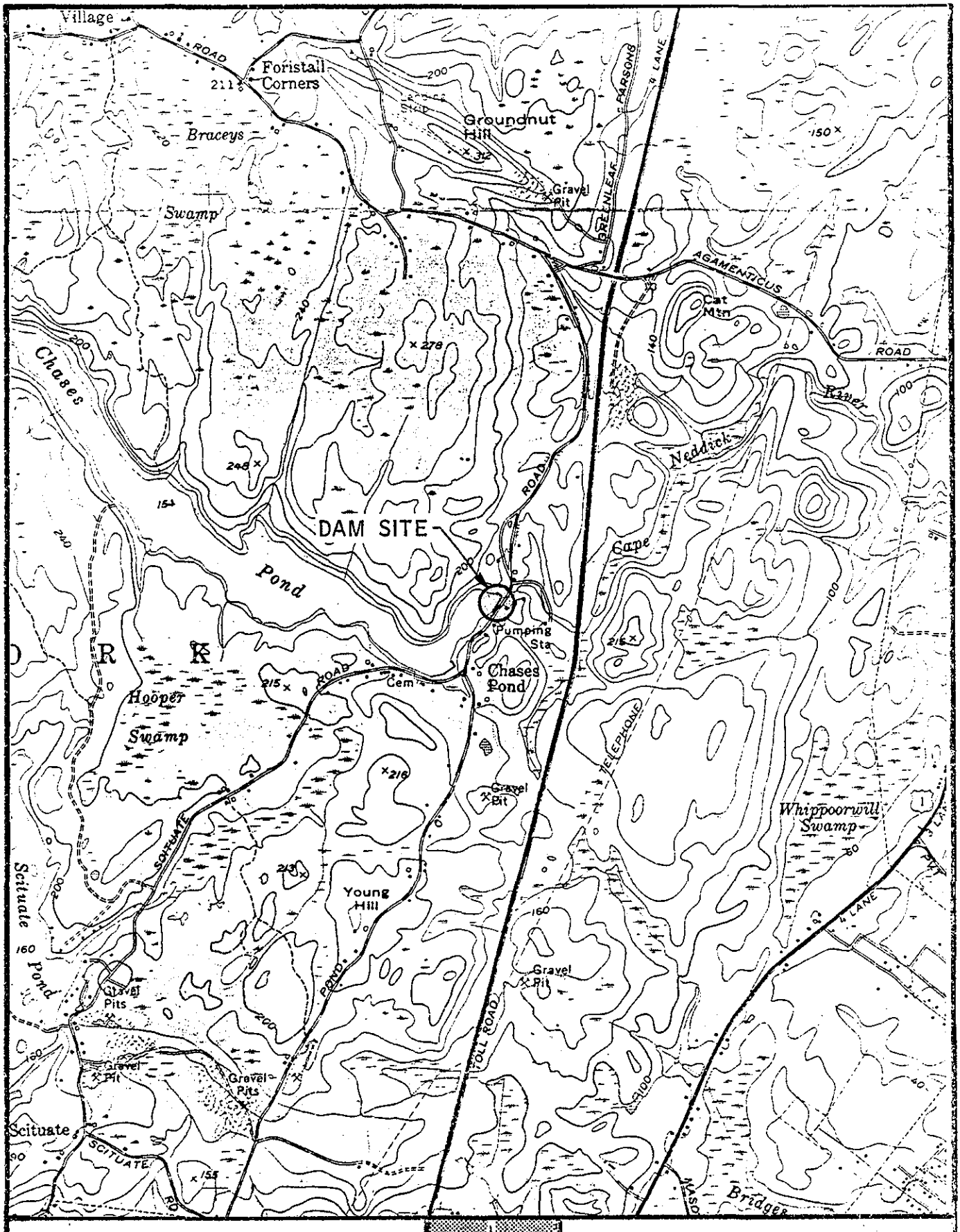


DAM: Chases Pond

IDENTIFICATION NO. ME 00188

N

LOCATION MAP

U.S.G.S. QUADRANGLE

YORK HARBOR, ME

APPROX. SCALE: 1"= 2000'

FILE NO. 4454 A38

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
CHASES POND DAM
ME 00188

SECTION 1 - PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England region.

Haley & Aldrich, Inc. has been retained by the New England Division to inspect and report on selected dams in the States of New Hampshire and Maine. Authorization and notice to proceed were issued to Haley & Aldrich, Inc. under a letter dated 31 October 1979 from Colonel William E. Hodgson, Jr., Corps of Engineers. Contract No. DACW33-80-C-0009 has been assigned by the Corps of Engineers for this work. Camp, Dresser & McKee, Inc. was retained as consultant to Haley & Aldrich, Inc. on the structural, mechanical/electrical and hydraulic/hydrologic aspects of the Investigation.

b. Purpose of Inspection. The primary purposes of the National Dam Inspection Program are to:

1. Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

2. Encourage and prepare the states to initiate effective dam safety programs for non-Federal dams.

3. Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

a. Location. The dam is located at the eastern end of the reservoir it forms, Chases Pond, as shown on the Location Map, page vii. The latitude and longitude of the dam site are N43°11.5' and W70°39.0', respectively. Spillway discharge flows from the dam through flat and marshy terrain to the Cape Neddick River at a downstream distance of about 1,200 ft.

b. Description of Dam and Appurtenances. Chases Pond Dam consists of concrete spillway/gate structure with adjacent concrete walls backfilled on the upstream side and earth embankments (north and south dikes) at either end. Riprap at about a 2 horizontal to 1 vertical slope, and a near-vertical dry laid stone masonry wall, form continuous features along the upstream side of the dam. The crest length of the dam is about 645 ft. in a curved alignment. The height of the dam, at the spillway, is approximately 20 ft.

The spillway is concrete for its 35 ft. length, has an ogee shape and is in a side channel orientation (see Appendix page B-4). No sockets for pins or other provisions for flashboards are provided along the spillway crest. On the downstream side of the spillway the discharge channel is formed by exposed bedrock.

The gate structure forms the left spillway training wall and incorporates two 16-in.diameter water transmission lines and an 18-in. by 24-in. sluice gate controlled reservoir drain (see Appendix page B-5). A screen chamber is located within the structure and operators for the different gates are located at its top. The right spillway training wall and the left side of the gate structure both abut the concrete walls that extend to either side along the dam alignment.

The top of the left concrete wall is about 1 ft. wide, the upstream side is vertical and the downstream side sloped. From the dry laid stone wall at the reservoir edge to the toe of the sloped riprap backfill is a horizontal berm (see Appendix page B-5). The width of the berm increases from about 10 ft., adjacent to the gate structure, to about 20 ft., at its convergence with the left embankment. The wall extends approximately 45 ft. in a bowed alignment from the end of the gate structure before it meets the left embankment. The alignments of the wall and embankment approximately form a right angle.

The left embankment cross-section includes a dry laid stone wall at the reservoir edge, a horizontal berm approximately 20 to 25 ft. in width and a boulder paved slope to the crest of the embankment. The maximum height of the embankment is about 8 ft. with a crest width of 10 to 12 ft.

A recently constructed screen house (see Appendix page B-6) is located on the downstream side of the left embankment. A 6-ft. by 6-ft. by 8-ft. long box culvert is connected to the screen house by a 30-in. diameter intake pipe. An existing 30-in. diameter transmission main will be connected to the screen house and convey flow to the York Water District's pumping station located about 800 ft. downstream of the dam.

The concrete wall on the right of the dam has a cantilever stem, vertical upstream face and a slightly battered downstream face. On the upstream side, the heel of the base slab has a sloped backfill with riprap protection. A horizontal berm between the riprap and dry laid stone wall along this length of the dam is about 8 ft. wide. A paved gutter provides protection for the downstream toe of the base slab. The alignment of this wall is in two straight sections. The section from the spillway to the change in alignment is about 40.5 ft. long and is made up by two wall panels which also have the greatest wall height. The section after the change in alignment is about 145 ft. long.

The riprap for the embankment dike at the right end extends to the waters edge except for about 80 ft. at the extreme right end where the shoreline projects out into the reservoir. The maximum height of the embankment is approximately 6 ft. with a crest width of about 7 ft. The embankment has a straight alignment with a crest length of about 175 ft. The riprap on the upstream side of the embankment is the same as other portions of the dam, however, there is no evidence of a dry laid stone wall or horizontal embankment section.

The top of both walls is about 5.1 ft. above the spillway crest and a minimum of 2 ft. below the crest of the embankments at either end. During high project discharges, water would flow over the concrete walls before overtopping the embankments; the walls acting analogous to an emergency spillway. Along the downstream side of the right (cantilever) wall, the bituminous paved gutter forms a formal spill area for potential over-flowing water in addition to conveying surface runoff.

An approximately 500-ft. long earth dike is located along the southern end of Chases Pond about 1,300 ft. southwest of the dam. The dike provides protection for Scituate Road, located at the immediate downstream toe of the dike.

c. Size Classification. The storage to the top of Chases Pond Dam is estimated to be 2,130 acre-ft., and the corresponding hydraulic height of the dam is approximately 20 ft. Storage of from 1,000 to 50,000 acre-ft. and/or a height of from 40 to 100 ft. classifies a dam in the "intermediate" size category, according to the guidelines established by the Corps of Engineers. Although the height of this dam is less than 40 ft., it is classified as an "intermediate" size dam by virtue of its storage capacity.

d. Hazard Classification. Dam failure analysis computations in Appendix D, which are based on Corps of Engineers "Guidance for Estimating Downstream Dam Failure Hydrographs", demonstrate why this dam has been determined to have a significant hazard potential classification. A failure of the earth embankment located to the left of the spillway would inundate one existing house and the potential loss of life would be a few.

e. Ownership. The name, address and phone number of the current owner of Chases Pond Dam are:

York Water District
86 Woodbridge Road
York, Maine 03909
Phone (207) 363-2265

The York Water District has owned the dam since 1929.

f. Operator. Mr. David C. Michniewicz, Superintendent of York Water District, is responsible for operation, maintenance and safety of the dam. Mr. Michniewicz has been the Superintendent of the York Water District since 1976 and his phone number is (207) 363-2265.

g. Purpose of Dam. The dam was constructed to form a water supply reservoir for the Town of York, Maine, and has always been used for this purpose.

h. Design and Construction History. A blue print drawing entitled "Plan of Proposed Concrete Dam" and dated October 1906 for the original dam (see Appendix page B- 2), shows plan, elevation and cross-section views of the then proposed dam. The spillway crest of the original dam, intrepreted from more recent drawings, was at about El. 154.6. The 1906 drawing shows 2 ft. of freeboard from the spillway crest to the top of the gate structure, at its left, and training wall, on its right. It is probable that the prior top of dam was at an elevation of about El. 156.6.

In 1950, the facility was reconstructed to its present configuration, to increase the storage capabilities of Chases Pond. As part of this work, the spillway crest was raised. Concrete walls were built at either side and adjacent to the spillway/gate structure, and the earth embankments were constructed at the ends of the walls to the left (north) and right (south) of the spillway (see Appendix pages B-3 through B-5). In addition, due to the raised level of the reservoir an earth dike had to be constructed at a low area along the reservoir approximately 1,300 ft. southwest of the dam site.

The recent (1979) additions to the facility only affected the left (north) embankment. Installation of the 30-in. diameter intake pipe required that the embankment be breached and excavated to an elevation about 22.3 ft. below the top of the embankment. A cut-off wall was designed to be located around the intake pipe between the embankment and reservoir. The new facilities will replace the intakes and transmission lines presently in use.

i. Normal Operational Procedures. There is no formal written procedure for the operation of the dam. Water is withdrawn in response to demand by the York Water District. There are no provisions for flashboards and the reservoir is not lowered in anticipation of spring run-off. The water supply intake screens are cleaned as needed.

1.3 Pertinent Data

All elevations reported herein refer to an as-built spillway crest elevation, provided by the Superintendent of the York Water District. The datum for the elevation is the National Geodetic Vertical Datum (NGVD).

a. Drainage Area. The drainage area tributary to the dam site is 4.1 sq. mi. The watershed is primarily undeveloped and heavily forested. With the exception of about 8 percent of the watershed which drains Mt. Agamenticus, the terrain is typical of flat and coastal drainage basins. The normal surface area of Chases Pond is 157 acres or about 6 percent of the total drainage area.

b. Discharge at Dam Site

1. Outlet works.....	50 cfs through the 18-in. by 24-in. reservoir drain (invert El. 143.7) with water surface at spillway crest
2. Maximum known flood at dam site..	Unknown (maximum head on spillway reported at 1.5 to 2.0 ft. during storms in the 1960's)
3. Ungated spillway capacity at top of dam.....	1,600 cfs at El. 162.7
4. Ungated spillway capacity at test flood pool elevation.....	1,100 cfs at El. 161.7
5. Gated spillway capacity at normal pool elevation.....	Not applicable
6. Gated spillway capacity at test flood pool elevation.....	Not applicable
7. Total spillway capacity at test flood pool elevation.....	1,100 cfs at El. 161.7
8. Total project discharge at test flood pool elevation.....	1,100 cfs at El. 161.7

c. Elevation (ft. above NGVD)

1. Streambed at centerline of dam...	142.4
2. Test flood tailwater.....	152.0
3. Upstream portal invert diversion tunnel.....	Not applicable
4. Normal pool.....	157.6
5. Full flood control pool.....	Not applicable
6. Spillway crest.....	157.6
7. Design surcharge - original design.....	Unknown
8. Top of dam.....	162.7
9. Top of dike.....	162.7
10. Test flood surcharge.....	161.7

d. Length of Reservoir (mi. estimated)

1. Normal pool.....	2.3
2. Flood control pool.....	Not Applicable
3. Spillway crest pool.....	2.3
4. Top of dam.....	2.7
5. Test flood pool.....	2.6

e. Storage (acre-ft.)

1. Normal pool.....	1,180
2. Flood control pool.....	Not applicable
3. Spillway crest.....	1,180
4. Top of dam.....	2,130
5. Test flood pool.....	1,930

f. Reservoir Surface (acres)

1. Normal pool.....	157
2. Flood control pool.....	Not applicable
3. Spillway crest.pool.....	157
4. Top of dam.....	196
5. Test flood pool.....	188

g. Earth Embankments

	Dam	Dike
1. Type.....	Zoned earth fill (See Appendix pages B-3 and B-5)	
2. Crest length.....	645 ft.	500 ft.
3. Height.....	20 ft. (at spillway)	6 ft. (at maximum section)
4. Top width.....	10-12 ft. left side; 7 ft. right side	8 ft.
5. Side slopes.....	2H to 1V both U/S and D/S	2.5H to 1V U/S 4H to 1V D/S

6.	Zoning.....	Pervious fill (shells) over impervious core with rip rap on upstream side	
7.	Impervious core.....	Impervious fill exact composition unknown	
8.	Cutoff.....	Below impervious core, exact extent unknown	Approximately 2 ft. above prior grade
9.	Grout curtain.....	None known to exist	
10.	Other.....	Earth embankments (dam and dike) were built in 1950 reconstruction of the facility	

h. Diversion and Regulating Tunnel..... Not applicable

i. Spillway

1.	Type.....	Concrete ogee with 1.5H to 1.0V inclined U/S face
2.	Length of weir.....	35 ft.
3.	Crest elevation.....	157.6
4.	Gates.....	None
5.	U/S channel.....	Chases Pond, approx. 14 ft. in depth at U/S face of spillway
6.	D/S channel.....	Side channel discharge spillway with concrete slab on ledge leading to Little Pond
7.	General.....	Little Pond Dam (approx. 10 ft. in height) located about 150 ft. D/S of dam

j. Regulating Outlets. The existing intake facilities, or gate structure, located at the left side of the spillway, incorporate an 18-in. by 24-in. sluice gate controlled reservoir drain at invert El. 143.7, two 16-in. diameter water transmission lines at invert El. 145.7 and a 6-in. diameter drain for the screen chamber. The 18-in. by 24-in. reservoir drain is gated within the gate chamber and the 16-in. transmission lines are each gated within the screen chamber and at the downstream face of the gate structure, as is the 6-in. drain. In addition to the above intake facilities presently in use, there is a 30-in. diameter intake line located through the left earth embankment to the recently built (1979) screen house at about an invert El. 145.8.

SECTION 2 - ENGINEERING DATA

2.1 Design Data

In 1906, a concrete gravity dam was designed and constructed at the site for private interests known as the York Shore Water Co. An original plan by R.W. Libby, Engineer, of Saco, Maine, was located at the offices of the York Water District (see Appendix page B-2). This plan was addressed to Mr. Josiah Chase indicating that the dam may have been built by personnel employed by him.

The storage capacity (reservoir level and area) of Chases Pond was increased by a reconstruction of the dam in 1950. The modifications to the then existing facility were designed by Metcalf & Eddy, Engineers, (see Appendix pages B-3 through B-5) and constructed by Varwood Co., Inc. It is believed that Varwood Co., Inc., once of Wakefield, Massachusetts, is no longer in existence.

During 1979, an intake structure and screen house were constructed at the left side of the dam (see Appendix page B-6). Design plans for the work may be obtained from Kleinschmidt & Dutting, Consulting Engineers. This work was contracted by Bradley Environmental Constructors of Rochester, New Hampshire.

2.2 Construction Data

Drawings prepared for the reconstruction of the dam show the general configuration of the then existing dam, built in 1906, and were the only as-built information located for the original dam. No as-built information or records documenting the work during the reconstruction of the dam were located and none are believed to exist. As of the date of this report, all the work on the 1979 additions was not complete and records, in turn, were not available.

2.3 Operation Data

No operational data, other than reservoir levels and water usage records, were located.

2.4 Evaluation of Data

a. Availability. A list of the engineering data available for use in preparing this report is included in page B-1. Selected documents from the listing are also included in Appendix B.

b. Adequacy. There was a considerable amount of engineering data available to aid in the evaluation of Chases Pond Dam. A review of these data in combination with visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application of engineering judgement, was adequate for the purposes of a Phase I assessment.

c. Validity. The information contained in the engineering data may generally be considered valid. However, details on the drawings are shown as designed and may vary from those actually built. For example, the full extent and exact configuration of the cut off wall to the left of the dam is unknown. Also, the crest of the spillway was designed to be reconstructed at El. 157, however, the Superintendent of the York Water District in his own topographic survey of the site established the spillway crest elevation as being El. 157.6.

SECTION 3 - VISUAL EXAMINATION

3.1 Findings

a. General. The Phase I visual examination of Chases Pond Dam was conducted on 15 November 1979. The upstream water surface elevation was about 2.4 ft. below the spillway crest that day. An excavation through the left dike for the installation of the new intake pipe was viewed during a preliminary visit on 17 October 1979. However, work was being conducted in-the-wet and the conditions at that time could not be assessed.

In general, the project was found to be in fair condition. Several deficiencies which require correction were noted.

A visual inspection check list is included in Appendix A and selected photographs of the project are given in Appendix C. A "Site Plan Sketch", page C-1, shows the direction of view for each photograph.

b. Dam. The masonry portions of Chases Pond Dam, which include the spillway/gate structure, left gravity wall, right cantilever wall and dry laid stone wall along the upstream side, are generally in fair condition. The earth embankment at either end of the dam are in fair to good condition.

The spillway/gate structure, Photo No. 8, has a lightly eroded surface, but it does not appear to be of significance. There is a crack or opening near the spillway crest apparently where concrete placed for the 1950 reconstruction of the dam abuts the original concrete. Minor spalling, Photo No. 7, and areas of moisture were on the spillway surface but the conditions are not extensive. The upstream side of the intake or gate portion of the structure appeared to be a more recent placement of concrete and was in good condition. The downstream side of the structure, especially the lower regions, showed efflorescence, spalling, some cracking and general surface deterioration.

The visible portion of the gravity wall to the left of the spillway, Photo No. 9, has very pronounced surface deterioration in the lower region of the downstream face. Other portions of this wall have surface crazing, efflorescence and shrinkage cracks. The major portion of the wall's downstream side is covered by an earth fill shell with a well vegetated surface of mowed grass.

Reconstruction of the left embankment, Photo No. 2, following installation of the new (1979) intake pipe was not yet complete. The top surface had not been brought to the required grade, Photo No. 3, nor had the downstream slope been finally shaped, loamed and seeded. The condition of the earth material placed at this section was soft (following recent rains) and irregular.

Mr. Gary Violette with Kleinschmidt & Dutting engineering consultants for the 1979 work, was present at the site and described the construction of the intake pipe through the left embankment. A previously unreported 1-ft. wide compacted clay cutoff wall on the upstream side of the embankment was exposed during the excavation for the intake pipe. The location of the cutoff wall was viewed during the preliminary site visit on 17 October 1979. The top of the clay was about 2 ft. below existing ground surface and 3 to 4 ft. from the dry laid stone wall. The cutoff wall could be seen at either side of the excavation but how far it extends to the left or right and its bottom elevation are unknown. Mr. Violette indicated that clay backfill was placed in-the-dry to reconstruct the embankment cross-section immediately behind the upstream stone wall. There are no trees or significant brush on the left embankment. The areas that are grass covered were mowed and in good condition.

The condition of the near-vertical dry laid stone wall on the left upstream side, in front of both the left embankment and gravity wall, is variable and generally fair to poor. At many locations, the stone is displaced and at some locations it has fallen off into the reservoir.

The riprap along the left upstream side is continuous from the spillway to the left end of the dam, Photo No. 3. The slope of the riprap is irregular and at the left gravity wall, about 8 to 12 in. below the top of the concrete.

The right cantilever wall, Photo No. 10, evidences early signs of major deterioration of the concrete (see Appendix page A-5). Many of the wall panels have edge and joint deterioration, a longitudinal crack along the top surface of the wall, surface crazing of the concrete and/or efflorescence on the downstream face. The second panel from the spillway, Photo No. 11, appears to have shifted or tilted outward from the alignment of the adjacent wall panels. Other than the second panel, the alignment of the wall is good, Photo No. 6.

The top surface of the wall where it abuts the upstream side of the spillway is deteriorated, Photo No. 7. This low deteriorated area exposes the adjacent cantilever wall backfill to potential scouring during higher than normal discharges over the spillway.

The upstream vertical stone wall at this section of the dam, Photo No. 5, is also in generally fair to poor condition. In several places, the stones have collapsed and in many areas they are out of alignment. Generally, the stone wall is in better condition within 50 ft. of the spillway.

The near horizontal portion of the embankment is covered with uncut grass and weeds. There are no brush or trees. There are small depressions from local sloughing within 2 to 3 ft. adjacent to the top of the dry laid stone wall due to the displaced conditions of the wall. The boulder riprap backfilled in this section of the dam is similar to that which occurs on the upstream side of the embankment at its right end.

The voids between some of the larger riprap on the right embankment, Photo No. 4, are filled with smaller stone. However, most of these voids are open. A bed of 1-in. nominal size crushed stone is frequently visible between the voids of the larger riprap. There are occasional weeds and light brush growing through the voids in the stone that comprises the only significant vegetation on the upstream slope.

The top of the embankment is covered by mowed grass in excellent condition, Photo No. 1. The downstream slope is also covered by grass to the shoulder of the adjacent asphalt concrete for Chases Pond Road. The vertical and horizontal alignment of the embankment are good.

c. Dike. The earth dike located to the southwest of the dam, Photo No. 13, has an 8 ft. wide crest paved with 0.75-in. screened stone. The upstream slope is approximately 2.5 horizontal to 1 vertical and is paved with large riprap similar to that used for the dam. The downstream slope is 4 horizontal to 1 vertical and covered with a dense growth of mowed grass.

On the downstream side, the earth dike is a maximum of 6 ft. in height. The crest elevation of the dike in relation to Chases Pond Dam could not be readily verified. The condition of the dike is excellent.

d. Appurtenant Structures. During the site examination, water was apparently being withdrawn through the water transmission pipelines, while the valve for the 6-in. diameter screen chamber drain was closed. The exact operating conditions of the water supply system at the time are unknown. The operability of the reservoir drain was not demonstrated as the Superintendent of the Water District was not present at the site. However, all valves and mechanisms appeared to be in operating condition.

The recently constructed water transmission facilities will replace those presently in use. The Superintendent of the York Water District reported that the two 16-in. diameter transmission mains will be abandoned but the intakes and operators at the gate structure will be maintained so as to provide additional outlet works discharge capacity.

e. Reservoir Area. Chases Pond is bordered by undeveloped, moderately sloped banks which are heavily forested. The surrounding terrain consists of flat, wooded marshlands. The pond is long and narrow having a length of about 12,000 ft. and an average width of only about 500 ft. There is no significant probability of landslides into the reservoir which could affect the safety of the dam. No conditions were noted that could result in a sudden increase in sedimentation load into the reservoir.

f. Downstream Channel. The spillway empties into a channel which passes under Chases Pond Road through a 15 ft. wide by 9.25 ft. high bridge opening. There is a small depression in the ground located downstream of the left gravity wall adjacent to the bridge abutment. It is probable that this depression has been caused by local run off. The upstream face of the bridge is 8 ft. from the downstream face of the dam. Approximately 150 ft. downstream of Chases Pond Dam is Little Pond Dam having a spillway crest length of about 30 ft. This dam, and the small pond that it creates, serve to protect the water transmission lines leaving the Chases Pond Dam outlet works from freezing. Approximately 1,200 ft. downstream of Little Pond Dam, the downstream channel is conveyed beneath the Maine Turnpike through a 8.25 ft. square box culvert before joining the Cape Neddick River.

3.2 Evaluation

Based on the visual examination conducted on 15 November 1979, Chases Pond Dam is considered to be in fair condition. However, the remedial measures outlined in Section 7.3 should be implemented to correct the noted deficiencies in the dam's concrete surfaces and upstream dry laid stone masonry wall.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General. In general, there are no formal procedures for the operation of the dam. There are no diversion or regulating tunnels nor provisions for flashboards. Water is withdrawn from the reservoir as needed by the Owner.

b. Description of any Warning System in Effect. There is no warning system or emergency preparedness plan in effect for this structure.

4.2 Maintenance Procedures

a. General. There are no established procedures or manuals for inspection and maintenance of the dam. Remedial measures such as the cutting of grass and brush along the embankments is reportedly performed on a regular basis.

b. Operating Facilities. The spillway structure does not appear to receive regular maintenance. There is no formal plan to maintain the reservoir drain and control or to keep the discharge channel free of debris. The operability of the drain was not demonstrated during the site visit as the Superintendent of the York Water District, Operator of the dam, was not present.

4.3 Evaluation

The Owner should prepare an operations and maintenance manual for the dam. The manual should delineate the routine operational procedures and maintenance work to be done on the dam to provide satisfactory operation and minimize deterioration of the facility. For example, an annual observation and maintenance program should be established to examine the dam, control vegetation growth and maintain slopes, walls and channels. A formal procedure should be established to operate the reservoir drain peridically.

Since failure of the dam would probably cause loss of life and property damage downstream, the owner should also prepare and implement a formal emergency preparedness plan and warning system.

SECTION 5 - EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

Chases Pond Dam is a water supply reservoir dam with a 35-ft. long side channel concrete ogee spillway. The spillway has concrete walls at either side, the top of which are 5.1 ft. above the spillway crest. Earth embankments, to the left and right of the concrete walls, have a crest elevation of 2.0 to 2.5 ft. higher than the concrete walls.

The primarily undeveloped 4.1 sq. mi. watershed consists of heavily forested terrain which is drained by numerous small brooks having considerable swamps and marsh. Chases Pond, which represents approximately 6 percent of the drainage basin, is long and narrow having a length of about 12,000 ft. and an average width of only about 500 ft.

5.2 Design Data

No hydraulic/hydrologic design data were located for the dam.

5.3 Experience Data

There are no official records of any major hydrological occurrences at Chases Pond Dam. According to the Owner, the most significant flows were experienced during storms of the 1960's when spillway discharge heads of 18-in. to 24-in. were observed.

5.4 Test Flood Analysis

Based on the Corps of Engineers Guidelines, the recommended test flood range for the size "intermediate" and hazard potential "significant" is the 1/2 PMF to PMF (Probable Maximum Flood). The 1/2 PMF was selected for the test flood as the storage of the facility places it near the low end of the size classification range. The PMF was determined using the Corps of Engineers Guidelines for "Estimating Maximum Probable Discharge" in Phase I Dam Safety Investigations. The 4.1 sq. mi. drainage area is typical of coastal basins with the exception of about 8 percent of the watershed which drains Mt. Agamenticus. A peak inflow rate of 850 csm was selected for the PMF inflow which results in a test flood inflow (1/2 PMF) of 1,750 cfs.

Surcharge storage routing of the test flood inflow was performed based on the Corps of Engineers Guidelines for "Estimating Effect of Surcharge Storage On Maximum Probable Discharges". The routed test flood outflow was determined to be 1,100 cfs at a pond stage of El. 161.7. Since the top of dam is at El. 162.7, the spillway is considered adequate to pass the routed test flood outflow.

5.5 Dam Failure Analysis

The analysis was based on the Corps of Engineers Guidelines for estimating dam failure hydrographs and assumes that a failure would occur along 40 percent of the mid-height length of the left earth embankment with pond level at top of dam. This section of the dam is considered to have the greatest potential for loss of life in the event of a failure. The peak failure outflow was determined to be 3,900 cfs in addition to the 1,100 cfs spillway discharge occurring prior to failure. As a result of the assumed dam failure, the York Water District's screening building, located at the toe of the left earth embankment, would be impacted as well as one house, located about 200 ft. downstream of the dam, which has a sill elevation approximately 6 ft. lower than the top of dam. Flooding depths at this structure would be in the order of 4 ft. above the sill elevation. After joining the downstream channel, the combined dam failure outflow and spillway discharge would be conveyed approximately 1,200 ft. to the Maine Turnpike highway embankment. Analysis indicates that the turnpike would not be overtopped as a result of a dam failure at the crossing of the downstream channel. Minor flooding of the turnpike is possible at the location of a second culvert located approximately 700 ft. south. However, such flooding would be of low depth and velocity. By visual inspection of downstream conditions at the earth dike there are no existing structures which would be affected by a failure of this structure.

The potential loss of life resulting from failure of the dam would be a few and the dam is accordingly classified in the "significant" hazard category.

SECTION 6 - EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

With the exception of the second cantilever wall panel to the right of the spillway and the upstream dry laid stone wall, there was no visual evidence of major settlement, lateral movement or other signs of structural instability in the earth fill or masonry portions of Chases Pond Dam. The noted cantilever wall panel did evidence some outward displacement or tilting. This condition could be caused by either construction error or structural yielding. The condition of the dry laid stone has probably been caused as a general deterioration due to wave action at the reservoir's shoreline and warrants attention.

The riprap backfill on the upstream side of both the left gravity and right cantilever walls is lower than the top of the walls. It is possible that these sections were constructed with the configuration or that natural post construction settlement has occurred. In either case, both walls appear, overall, to be in good vertical and horizontal alignment.

6.2 Design and Construction Data

In general, the designed cross-sections of the dam indicate configurations which would be expected to have adequate factors of safety normally used for structures of comparable height with the possible exception of the one cantilever wall panel recommended for investigation in the preceding paragraphs. This particular cantilever wall panel probably has a lower factor of safety than the adjacent panels due to, 1) it has the greatest wall height, 2) it is not restrained by a return wall as in the case of the wall panel to its immediate left, 3) the footing is positioned more to the front of the wall than the other panels and 4) the foundation is at the lowest elevation of all wall panels thus probably having greater upward hydrostatic pressures on the base.

6.3 Post-Construction Changes

At the time of the Phase I Investigation of Chases Pond Dam, a new intake structure and screen house were under construction as previously described in Sections 2.2, 3.1b and 3.1d.

6.4 Seismic Stability

Chases Pond Dam is located in Seismic Zone 2 and in accordance with Recommended Phase I Guidelines does not warrant seismic analysis provided static stability conditions are satisfactory and conventional safety margins exist. One wall panel exhibits some movement indicating conventional safety margins may not exist. Seismic analysis of this section should be performed.

SECTION 7 - ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. The visual examination of Chases Pond Dam revealed that the structure was in fair condition. Although there were no signs of conditions which would warrant urgent remedial action, deficiencies in the form of one displaced cantilever wall panel, surface deterioration of concrete and deterioration of the upstream dry laid stone wall were noted.

Based on the results of computations included in Appendix D and described in Section 5, the spillway is capable of passing the test flood, which for this structure is the 1/2 PMF, without overtopping the dam. With the water level at the top of the dam, the spillway capacity is approximately 1,600 cfs. The routed test flood outflow of 1,100 cfs (inflow of 1,750 cfs or 425 csm) could be passed with a freeboard of 1.0 ft. and an unused surcharge-storage of 200 acre-ft. remaining.

b. Adequacy of Information. This evaluation of the dam is based primarily on visual examination, preliminary hydraulic and hydrologic computations, consideration of past performance and application of engineering judgement. Generally the information available or obtained was adequate for the purposes of a Phase I assessment. However, it is recommended that additional information regarding the stability of the second cantilever wall panel from the right end of the spillway along the downstream face of the dam and the extent and necessity of repairs to the deteriorated concrete sections, as outlined in Section 7.2, be obtained.

c. Urgency. The recommendations for additional investigations and remedial measures outlined in Section 7.2 and 7.3 respectively, should be undertaken by the Owner and completed within one year after receipt of this report.

7.2 Recommendations

It is recommended that the Owner engage a registered professional engineer qualified in the design and construction of dams to undertake the following investigations:

1. Determine the structural stability, including the seismic stability, of the second wall panel from the right end of the spillway along the downstream face of the dam. The investigation should include the effect of seepage and groundwater pressures on this structural element.

2. Determine the depth of surface deterioration of concrete elements and the necessity and means of repair.

The Owner should then implement corrective measures on the basis of these engineering evaluations.

7.3 Remedial Measures

Although the dam is generally in fair condition, it is considered important that the following items be accomplished.

a. Operation and Maintenance Procedure. The following should be undertaken by the Owner:

1. Extend the area of riprap adjacent to the right end of the spillway to provide scour protection adjacent to the upstream face of the spillway training wall.

2. Monitor the condition of the left embankment in the area of 1979 excavation with attention to the development of any transverse cracks or irregular settlement. Observation of the conditions in this area should be maintained for the next two to three years, particularly during high reservoir levels.

3. Fill the small depression in the ground located downstream of the left gravity wall adjacent to the bridge abutment. The area should be monitored to detect any future subsidence

4. Rebuild the failed portions of the dry laid stone wall. A regular maintenance program to correct future localized failures of the stone wall should be developed.

5. Operate the valves and reservoir drain mechanisms at the gate structure to insure their operability. In addition, a procedure should be established to operate the reservoir drain periodically.

6. Prepare an operations and maintenance manual for the dam. The manual should include provisions for annual technical inspection of the dam and for round-the-clock surveillance of the dam during periods of heavy precipitation and high project discharges. The procedures should delineate the routine operational procedures and maintenance work to be done on the dam to ensure safe, satisfactory operation and to minimize deterioration of the facility.

7. Develop a written emergency preparedness plan and warning system to be used in the event of impending failure of the dam or other emergency conditions. The plan should be developed in cooperation with local officials and downstream inhabitants.

7.4 Alternatives

There are no practical alternatives to the above recommendations.

APPENDIX A - INSPECTION CHECK LIST

VISUAL INSPECTION PARTY ORGANIZATION

NATIONAL DAM INSPECTION PROGRAM

Dam: Chases Pond

Date: 15 November 1979

Time: 1345 to 1640

Weather: Clear with cold temperatures (approximately 40°F)

Water Surface Elevation Upstream: El. 155.2 (Approximately 2.4 ft. below top of concrete spillway weir)

Stream Flow: None

Inspection Party:

Harl P. Aldrich, Jr. Charles R. Nickerson Haley & Aldrich, Inc.	-	Soils/Geology
Joseph E. Downing	-	Hydraulic/Hydrologic
Roger H. Wood Camp, Dresser & McKee, Inc.	-	Structural/Mechanical

Present During Inspection:

Gary Violette, Kleinschmidt & Dutting, Consulting Engineers (for part of the time)

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	El. 157.6
Current Pool Elevation	El. 155.2
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed
Pavement Condition	No pavement
Movement or Settlement of Crest	None observed; dike at location of new water intake pipe not restored to final grade on this date, see text
Lateral Movement	None observed
Vertical Alignment	Good
Horizontal Alignment	Satisfactory (curved)
Condition at Abutment and at Concrete Structures	Satisfactory
Indications of Movement of Structural Items on Slopes	No structural items on slopes
Trespassing on Slopes	Unrestricted
Animal Burrows in Embankment	None observed
Vegetation on Embankment	Mowed grass, good condition
Sloughing or Erosion of Slopes or Abutments	None observed of significance
Rock Slope Protection - Riprap Failures	Dry laid stone wall at upstream toe in fair to poor condition; boulder riprap in satisfactory condition
Unusual Movement or Cracking at or near Toes	Movement at upstream "vertical" dry laid stone wall, see text
Unusual Embankment or Downstream Seepage	None observed
Piping or Boils	None observed
Foundation Drainage Features	None known to exist
Toe Drains	None known to exist
Instrumentation Systems	None

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	(This relates to outlet works adjacent to weir and does not include the separate underwater intake currently under construction and not visible for inspection.)
a. Approach Channel	Intake structure at pond - no approach channel
b. Intake Structure	
Condition of Concrete	New concrete on upstream face is in very good condition. Older concrete, sides and downstream faces, has a poor exposed surface
Stoplogs and Slots	None observed
Condition of Joints	Not applicable
Spalling	Surface spalls on sides and downstream faces
Visible Reinforcing	None observed
Rusting or Staining of Concrete	None observed
Any Seepage or Efflorescence	Efflorescence on all sides
Joint Alignment	Not applicable
Unusual Seepage or Leaks in Gate Chamber	Not visible
Cracks	Minor shrinkage cracks at top surface and crack at the junction of new and old concrete
Rusting or Corrosion of Steel	None observed
c. Mechanical and Electrical	Three manually operated gates (2 for water supply lines and 1 for waste gate). The gates appear to be operational. No electrical services observed

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Weir is at edge of pond - no channel
Loose Rock Overhanging	None observed
Trees Overhanging	None observed
Floor of Approach Channel	Not visible
b. Weir and Training Walls	
General Condiion of Concrete	Weir downstream surface is eroded. Walls have surface deterioration and spalls
Rust or Staining	None observed
Spalling	Minor surface spalls on weir. Appreciable surface spalls on side walls
Any Visible Reinforcing	None observed
Any Seepage or Efflorescence	Channel at base of weir moist. Efflorescence at right downstream side
Cracks	Longitudinal crack at top of weir
Drain Holes	None observed
c. Discharge Channel	
General Condition	Side channel dishcarge. Back wall is in very good condition. Upstream side wall has efflorescence and surface deterioration
Loose Rock Overhanging Channel	None observed
Trees Overhanging Channel	None observed
Floor of Channel	Ledge and concrete - good condition

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
Other Obstructions	None observed
Bridge over Channel	Bridge appears in good condition but underside not accessible for detailed inspection due to ponded water
DAM - CONCRETE PORTION	The concrete portion of the dam in the form of walls on each side of the spillway
a. Right Wall (starting at right end)	
1st Panel	Longitudinal crack along top of wall and efflorescence and crazing on downstream face
1st & 2nd Panel Joint	Concrete spall at top and general joint deterioration
2nd Panel	Longitudinal crack along top of wall and efflorescence and crazing on downstream face
2nd & 3rd Panel Joint	Joint deterioration at downstream face
3rd Panel	Crazing on downstream face
3rd & 4th Panel Joint	Joint appears in good condition
4th Panel	Longitudinal crack along top of wall and crazing on downstream face
4th & 5th Panel Joint	Joint deterioration at top of wall and slight efflorescence at downstream face of joint
5th Panel	Longitudinal crack along top of wall and crazing and slight efflorescence on downstream face
5th & 6th Panel Joint	Longitudinal crack opens at joint at the top of wall
6th Panel	Longitudinal crack and edge deterioration along top of wall and crazing and some efflorescence on downstream face
6th & 7th Panel Joint	Joint deterioration present

VISUAL INSPECTION CHECK LIST
NATIONAL DAM INSPECTION PROGRAM

DAM: Chases Pond DATE: 15 Nov. 79

AREA EVALUATED	CONDITION
7th Panel	Panel appears to have experienced some outward movement or tilting. The upstream surface has considerable light efflorescence present. There is edge deterioration along the top and surface loss and efflorescence on the downstream face
7th & 8th Panel Joint	Heavy efflorescence at the downstream face of the joint and general joint deterioration
8th Panel	The upstream return of this wall has considerable deterioration at the weir. The top of the wall has edge deterioration and there is surface loss and efflorescence (heavy in the lower portion) on the downstream face
b. Left Wall	The downstream face has crazing, cracks, efflorescence and surface deterioration present. It has very pronounced surface deterioration present at the bottom of the exposed portion of the wall. The top of the wall exhibits shrinkage cracking and the upstream face of the wall has light efflorescence present

FILE NO. 4454

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

APPENDIX B - ENGINEERING DATA

LIST OF AVAILABLE DATA
CHASES POND DAM

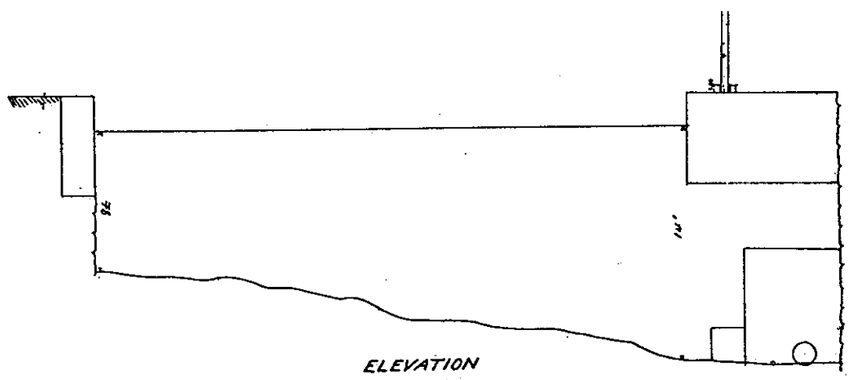
Document	Contents	Location
Application for Dam Registration	State of Maine registration form form for Chases Pond Dam dated 9 August 1978	Maine Soil and Water Conservation Commission Department of Agriculture State of Maine State Office Building Augusta, Maine 04333
Subsurface Investigation; Proposed Water Treatment Facility, York, Maine	Jordon Gorrill Associates report to Kleinschdmit & Dutting dated 30 January 1978	York Water District 86 Woodbridge Road York, Maine 03909
Kleinschmidt & Dutting letter to State Soil and Water Conservation Commission	Notice of intent to breach the earthen dike that holds Chases Pond dated 9 October 1978	Maine Soil and Water Conservation Commission
Registration of Dam, Renewal Form	State of Maine, registration renewal form for Chases Pond Dam dated 8 February 1979	Maine Soil and Water Conservation Commission
Application for Dam Registration	State of Maine registration form for Little Pond dam dated August 1978	Maine Soil and Water Conservation Commission
Registration of Dam, Renewal Form	State of Maine registration renewal form for Little Pond Dam dated 8 February 1979	Maine Soil and Water Conservation Commission

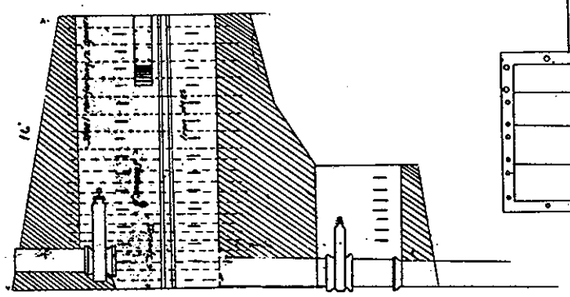
PLAN OF PROPOSED CONCRETE DAM
FOR
YORK SHORE WATER CO.
YORK ME.

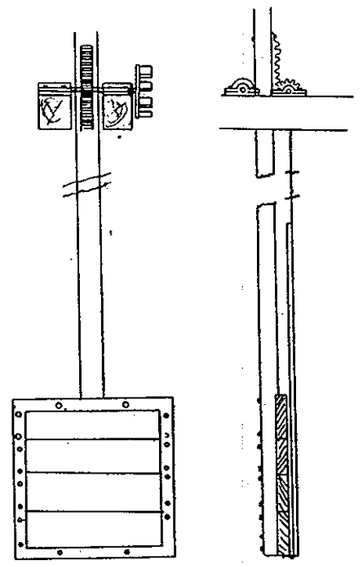
Oct. 1906

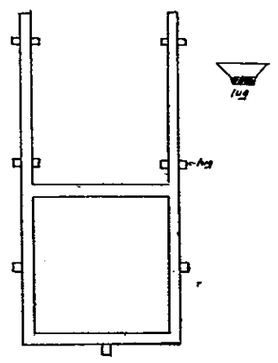
SCALE 1 in = 8 ft

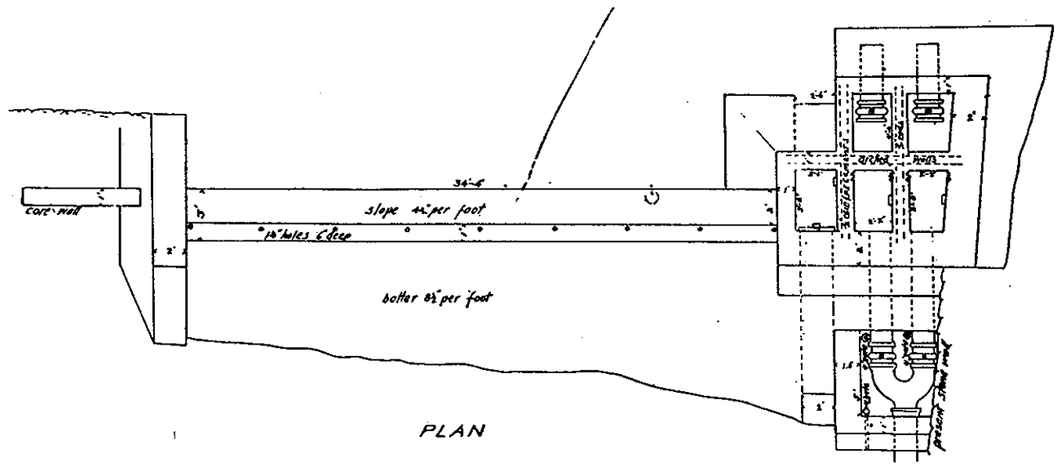
R.W. Tibbby Engineer
Saco Me.

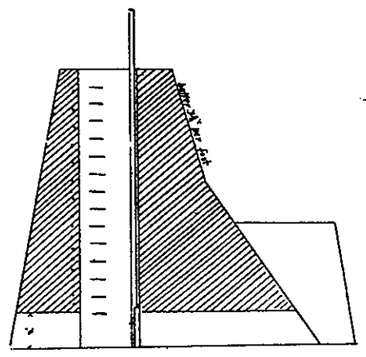


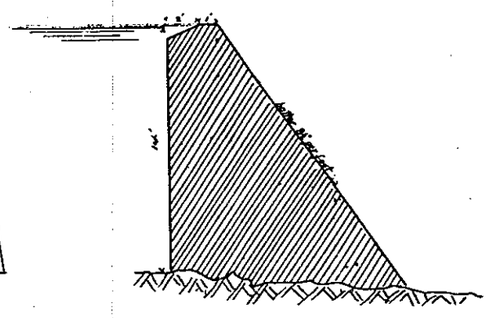






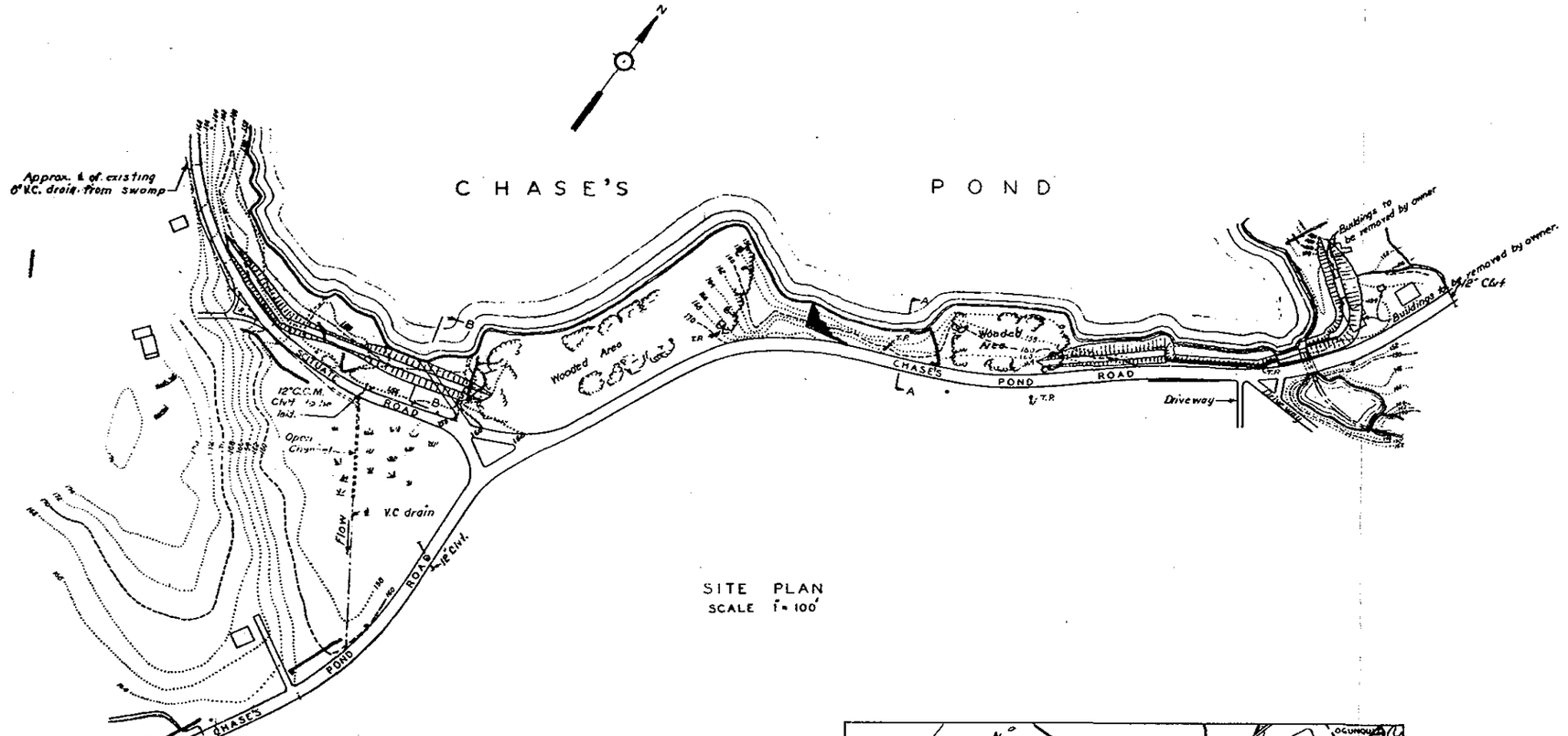




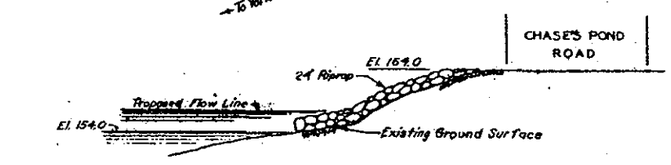


FILE NO. 4454 B41

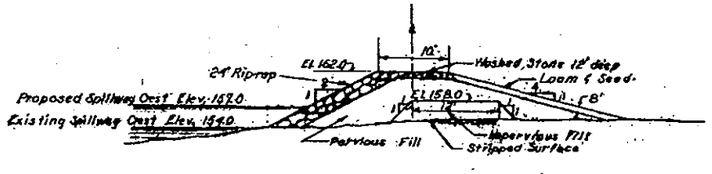
B-2



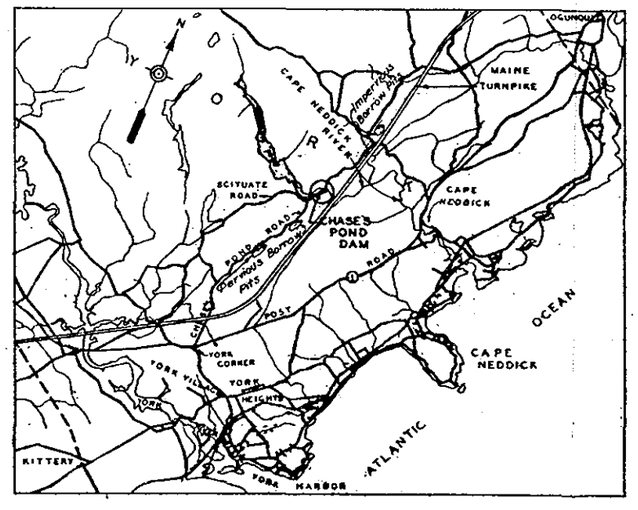
SITE PLAN
SCALE 1" = 100'



SECTION A-A
SCALE 1" = 10'-0"



SECTION B-B
SCALE 1" = 10'-0"



LOCATION PLAN
SCALE 1" = 1 MILE

YORK WATER DISTRICT
YORK, MAINE

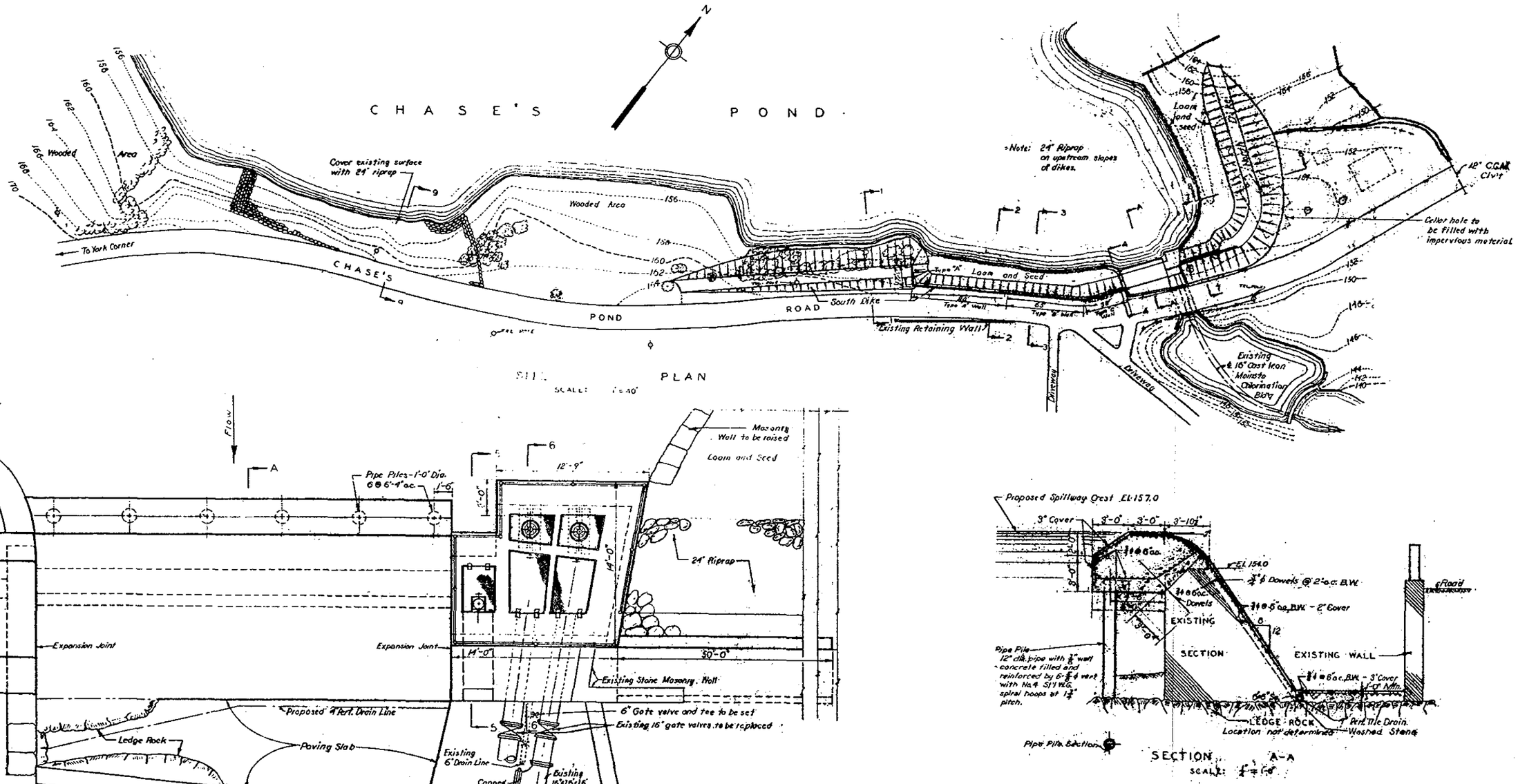
CHASE'S POND DAM

GENERAL PLAN

SCALE AS SHOWN JUNE 1969

APPROVED

FILE NO. 4454 B42



FILE NO. 4454 B43

DRAWN BY G.A.T.
TRACED BY G.A.T.
CHECKED BY L.E.C.

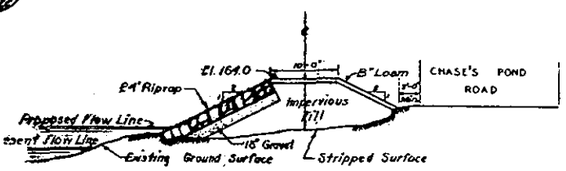
YORK WATER DISTRICT
YORK, MAINE.

CHASE'S POND DAM

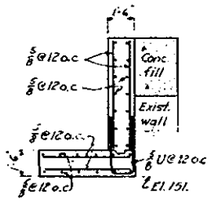
PLAN OF DIKES AND SPILLWAY

APPROVED

B-4



SECTION 1-1



SECTION C-C
TYPE 'E' WALL
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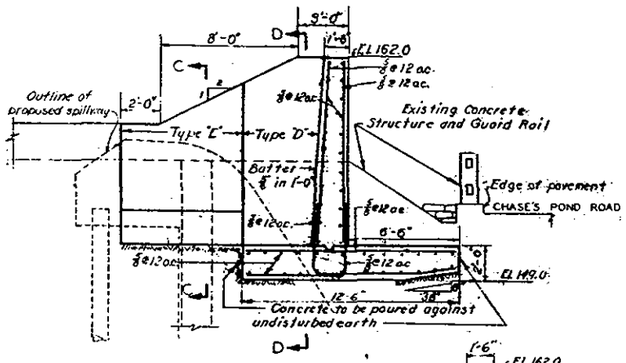

SECTION 4-4
TYPE 'C' WALL
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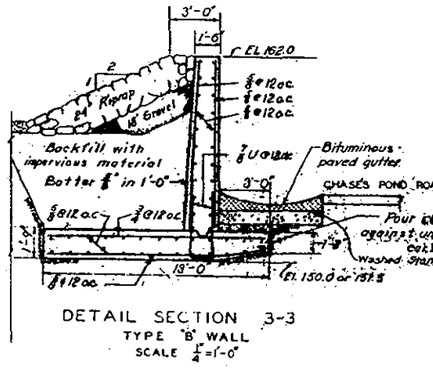
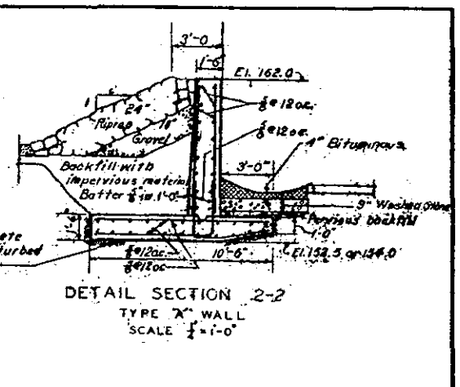
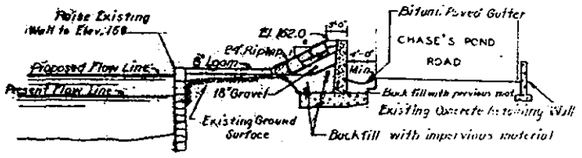


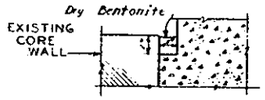
DETAIL SECTION 3-3
TYPE 'B' WALL
SCALE $\frac{1}{4}$"=1'-0"



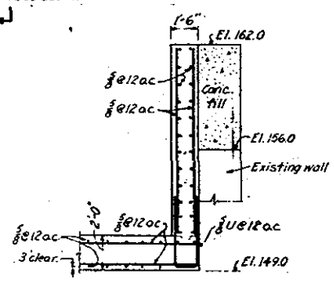
DETAIL SECTION 2-2
TYPE 'A' WALL
SCALE $\frac{1}{4}$"=1'-0"



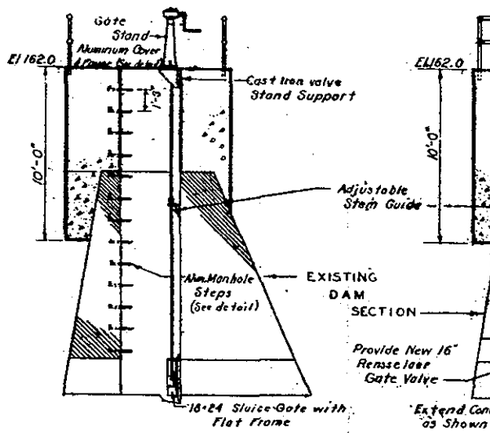
SECTION 2-2



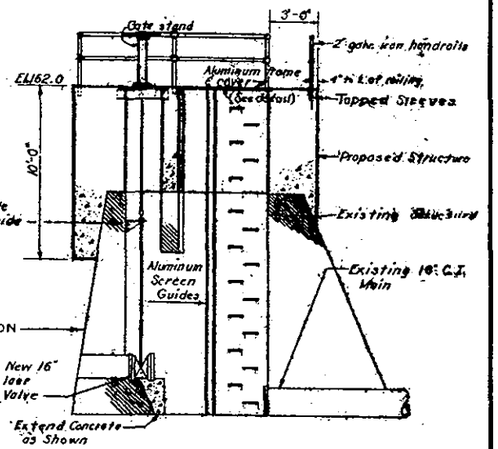
DETAIL OF JOINT AT CONTACT POINT BETWEEN EXISTING WALL AND CONCRETE GRAVITY WALL
SCALE $\frac{1}{4}$"=1 IN.



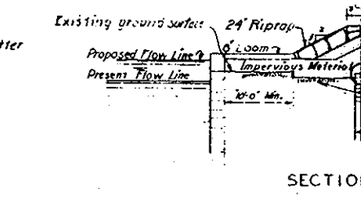
SECTION D-D
TYPE 'D' WALL
SCALE $\frac{1}{4}$"=1'-0"



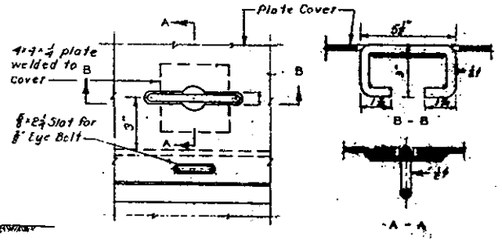
SECTION 5-5

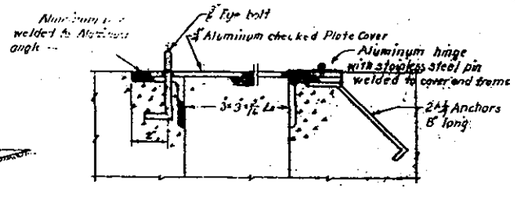


SECTION 6-6

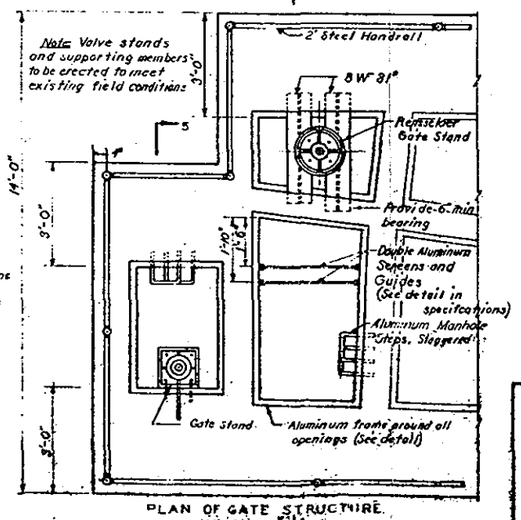


SECTION 8-8

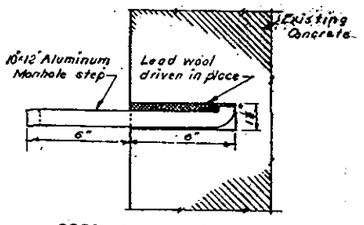




DETAIL OF PLATE COVER AND FRAME SHOWING HINGE, HANDLE AND EYE BOLT
SCALE 3"=1'-0"

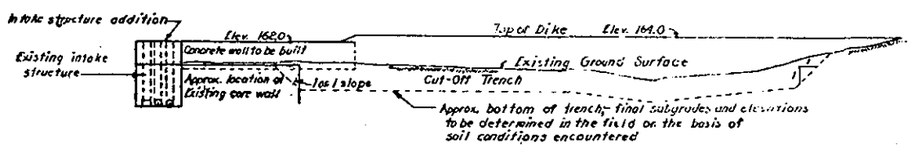


PLAN OF GATE STRUCTURE
SCALE $\frac{1}{4}$"=1'-0"



PROPOSED METHOD OF PLACING MANHOLE STEP INTO EXISTING WALL
SCALE 3"=1'-0"

NOTE:
$\frac{1}{4}$" chamfer for all exposed concrete corners.



CENTER LINE PROFILE NORTH DIKE
SCALE: 1"=20'

YORK WATER DISTRICT
YORK, MAINE

CHASE'S POND DAM

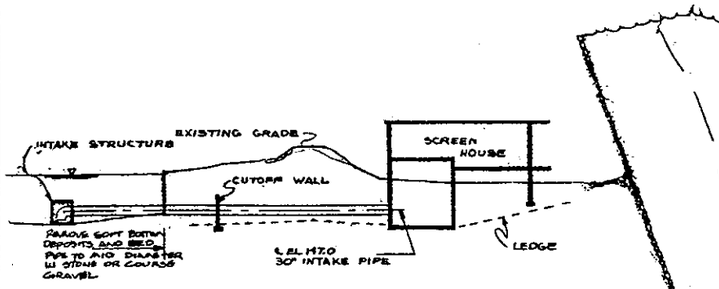
DETAILS

APPROVED

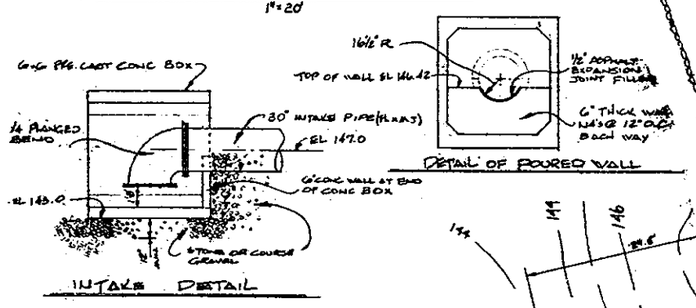
DRAWN BY CFC, DR, BAT
TRACED BY B.A.T.
CHECKED BY CFC

FILE NO. 4454 B44

B-5



INTAKE & SCREEN HOUSE PROFILE
1"=20'



DETAIL OF POURED WALL

INTAKE DETAIL

GENERAL NOTES

1. TOPOGRAPHY OBTAINED FROM SURVEY MADE BY PLATT C. HOULIARAS, YORK, MAINE IN 1977 & 1978.
2. ALL ELEVATIONS REFER TO U.S.G.S. MEAN SEA LEVEL DATUM.
3. THE LOCATION OF EXISTING PIPES, UNDERGROUND STRUCTURES AND PROPERTY LINES SHOWN ARE NOT WARRENTED TO BE EXACT NOR IS IT WARRENTED THAT ALL ARE SHOWN.
4. BORINGS AND PROBES WERE TAKEN BY MAINE TEST BORINGS INC.
5. BORING LOGS CAN BE REVIEWED AT THE OWNERS OFFICE.
6. ALL 30" PIPE & FITTINGS TO BE SUPPLIED BY OWNER AND INSTALLED BY CONTRACTOR.

CUTOFF WALL DETAIL
1"=4'

⚠ ELIMINATED DRAINAGE DITCH

TYPICAL

RICHARD F. DUTTING 2510 REGISTERED PROFESSIONAL ENGINEER

Date	Chkd.	Revision
12-13-78	R.L.B.	SHIFTED LAYOUT 7½"
10-12-78	R.L.B.	⚠ CHANGED 4 PLACES

Drawn by: RSC Date: 6-15-78
Checked by: R.L.B. Date: 9-13-78
Approved by: [illegible] Date: 9-13-78
Scale: 1"=10'

YORK WATER DISTRICT
WATER TREATMENT PLANT
CONTRACT NO. 3
INTAKE & SCREEN HOUSE
SITE PLAN & GENERAL NOTES

KLEINSCHMIDT & DUTTING
CONSULTING ENGINEERS
PITTSFIELD, MAINE

SHEET NO. 3 OF 12
B-14049

FILE NO. 4454 845

B-6

APPENDIX C - PHOTOGRAPHS

NOTES

PLAN DEVELOPED FROM "CHASE'S POND DAM, PLAN OF DIKES AND SPILLWAY", BY METCALF & EDDY, ENGINEERS, DATED MAY 1950 (SEE PAGE B-4), "INTAKE & SCREEN HOUSE, SITE PLAN AND GENERAL NOTES", BY KLEINSCHMIDT & DUTTING, CONSULTING ENGINEERS, DATED 13 SEPTEMBER 1978 (SEE PAGE B-6) AND FIELD OBSERVATIONS MADE ON 15 NOVEMBER 1979.

PHOTO NUMBER 13 TAKEN AT EARTH DIKE LOCATED 1,300 FEET SOUTHWEST OF DAM SITE.

LEGEND

(2) PHOTO NUMBER AND DIRECTION OF VIEW.

LITTLE POND DAM

WATER SUPPLY PIPELINES

N

LITTLE POND

DRIVEWAY

DRIVEWAY

LOW ROADWAY RETAINING WALL

SMALL DEPRESSION

LEFT SIDE

CHASES POND ROAD

RIGHT SIDE

GRAVITY WALL

EARTH EMBANKMENT

WOODED AREA

2 & 4

CANTILEVER WALL

SPILLWAY/GATE STRUCTURE

RIPRAP ON UPSTREAM SLOPES OF WALLS AND EMBANKMENTS

EXCAVATED AREA (1979)

SCREEN HOUSE

DRIVEWAY

EARTH EMBANKMENT

WOODED AREA

CHASES POND

(EL. 155.2)

Chases Pond Dam
York, ME

SITE PLAN SKETCH

Approx. Scale 1" = 40' April 1980

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

2. Overview of left embankment, upstream

3. Left embankment at location of 1979 work

4. Overview of right embankment and cantilever wall, upstream

5. Dry laid stone masonry along reservoir at right side

6. Alignment of right cantilever wall, spillway and left embankment

7. Alignment of spillway/gate structure, from right side

8. Spillway/gate structure, upstream

9. Spillway/gate structure and Chases Pond Road, downstream

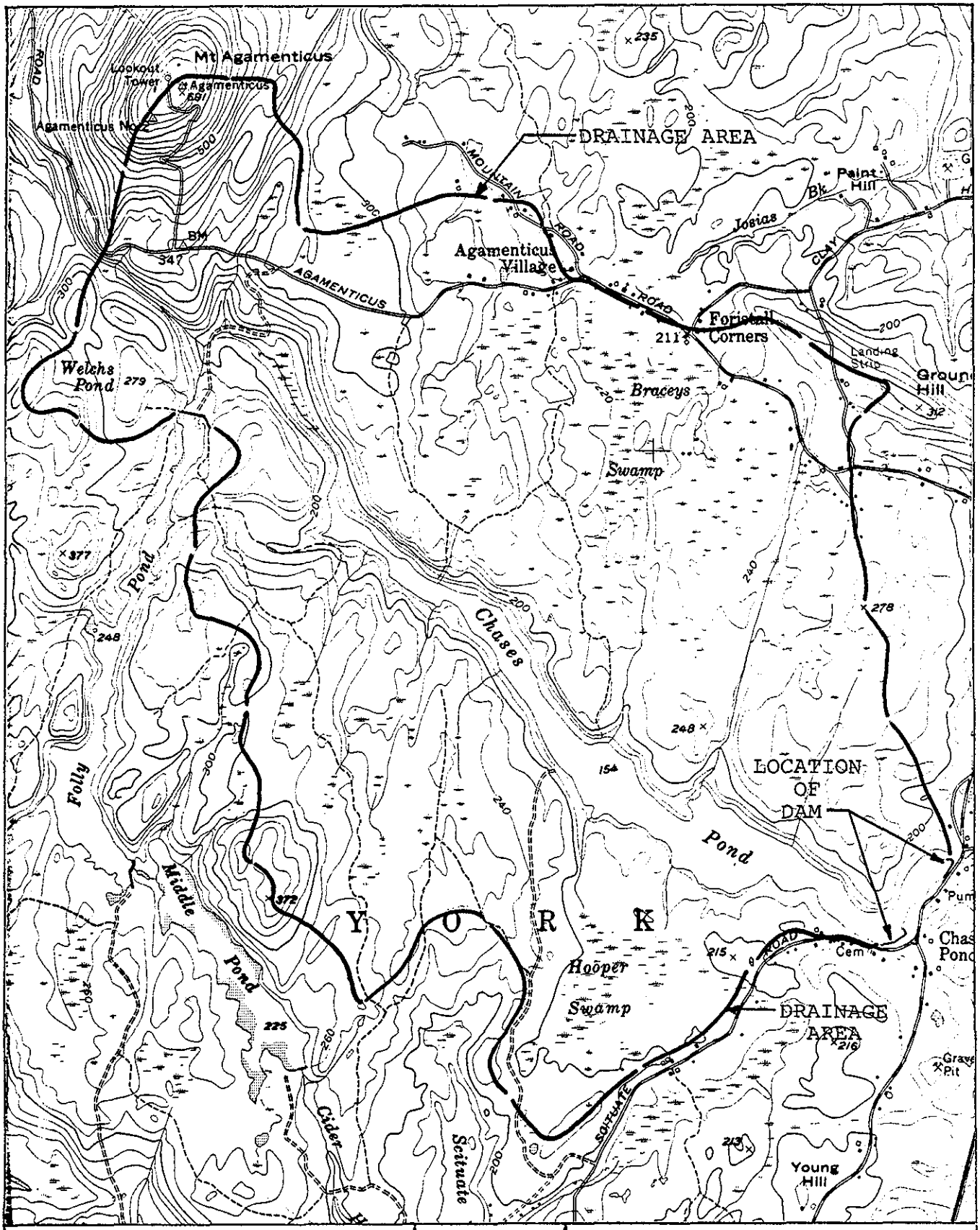
10. Cantilever wall, downstream

11. Tilted cantilever wall panel, downstream

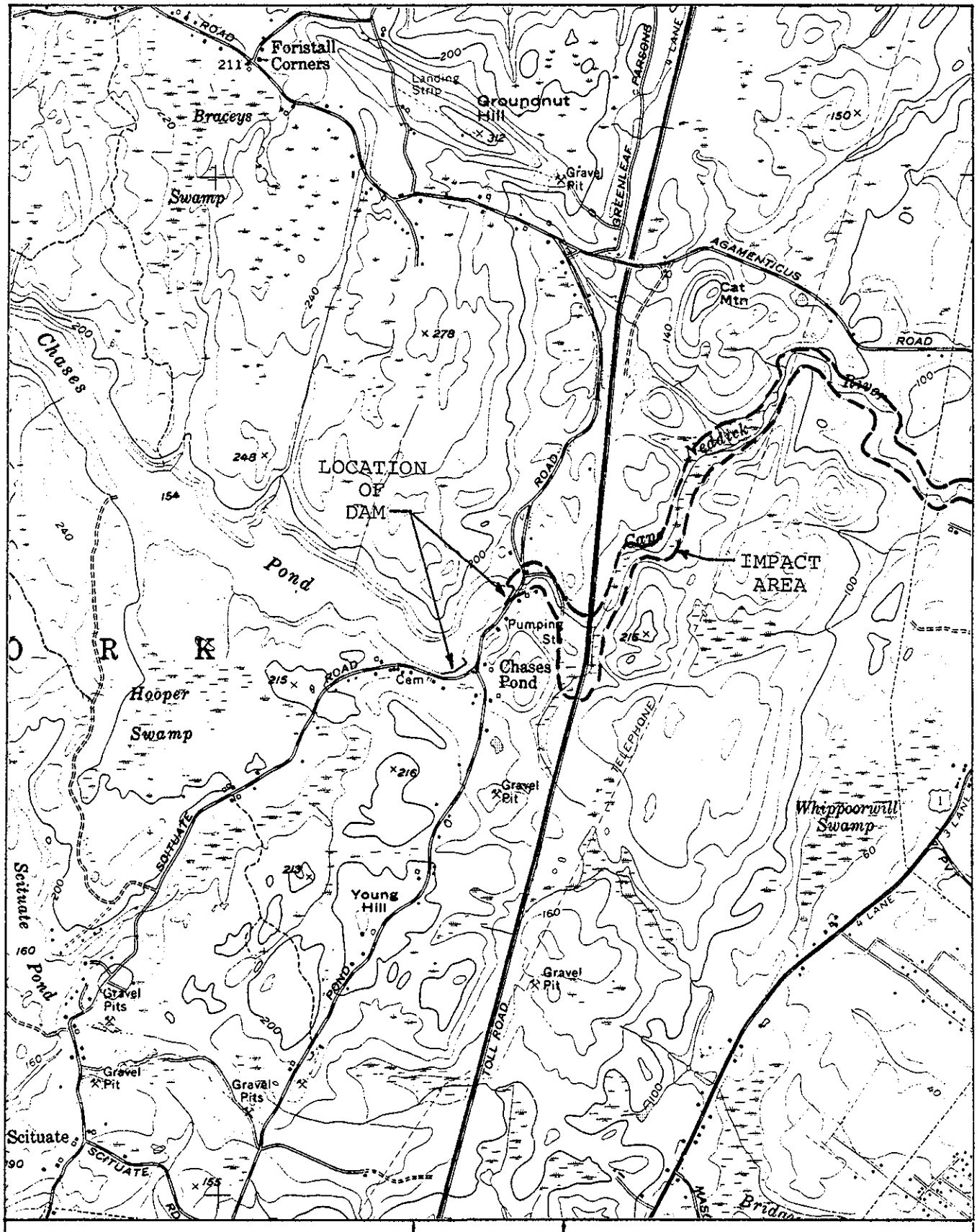
12. Little Pond and Little Pond Dam

13. Overview of crest, upstream and downstream sides of earth dike 1,300 ft. southwest of dam site

APPENDIX D - HYDROLOGIC AND HYDRAULIC COMPUTATIONS



CHASES POND DAM ME 00188		DRAINAGE AREA MAP APPROX. SCALE: 1" = 2000'



CHASES POND DAM ME 00188		DAM FAILURE IMPACT AREA MAP APPROX. SCALE: 1" = 2000'

ELEVATIONS * (USGS)

Spillway Crest El. 157.6
Top of Outlet Works Platform & 45' long Conc. Wall El. 162.7
Top of 165' long left Earth Dike El. 164.7
Top of Right 186' long Conc. Wall El. 162.7
Top of Right 200' long Earth Dike El. 165.0
Top of 500' long Remote Dike El. 162.7
Toe of Spillway El. 144.1
Inv. of Discharge Channel at Outlet Works El. 142.4

* Plans show spillway crest at El. 157.0. However, survey by owner puts spillway crest at El. 157.6. Therefore use 157.6 together with field & draw'g dimensions.

SURFACE AREAS

Drainage Area = 2,590 ac. = 4.1 sq. mi.

W.S. at El. 154 = 129 ac.
Area at El. 160 = 175 ac.
} USGS Quad., York Harbor, Me. 1956, Rev. 1973

STORAGE CAPACITIES

Water depth at spillway crest = 15 ft.
Surface Area at El. 157.6 = $\frac{175-129}{6} \times 3.6 + 129 = 157$ ac.

Est. Volume at El. 157.6 = $15/2 \times 157 \simeq 1{,}180$ ac-ft.

Surface Area at El. 162.7 = $\frac{175-129}{6} \times 2.7 + 175 = 196$ ac.

Est. Volume at El. 162.7 = $1180 + \frac{175+196}{2} \times 5.1 = 2{,}126$ ac.-ft.

SIZE CLASSIFICATION

Hydraulic Height = 162.7 - 142.4 = 20.3 ft.

Storage at top of dam = 2,126 ac-ft, say 2,130 ac-ft.

∴ Size is INTERMEDIATE based on storage.

HAZARD CLASSIFICATION

A failure of the dam and embankment to the left of the spillway would damage the Process Facilities Bld'g and inundated one residential house immeadiately d/s having a sill elev. approx. 6 ft. below top of dam. Potential loss of life would be a few.

∴ Hazard classification is SIGNIFICANT

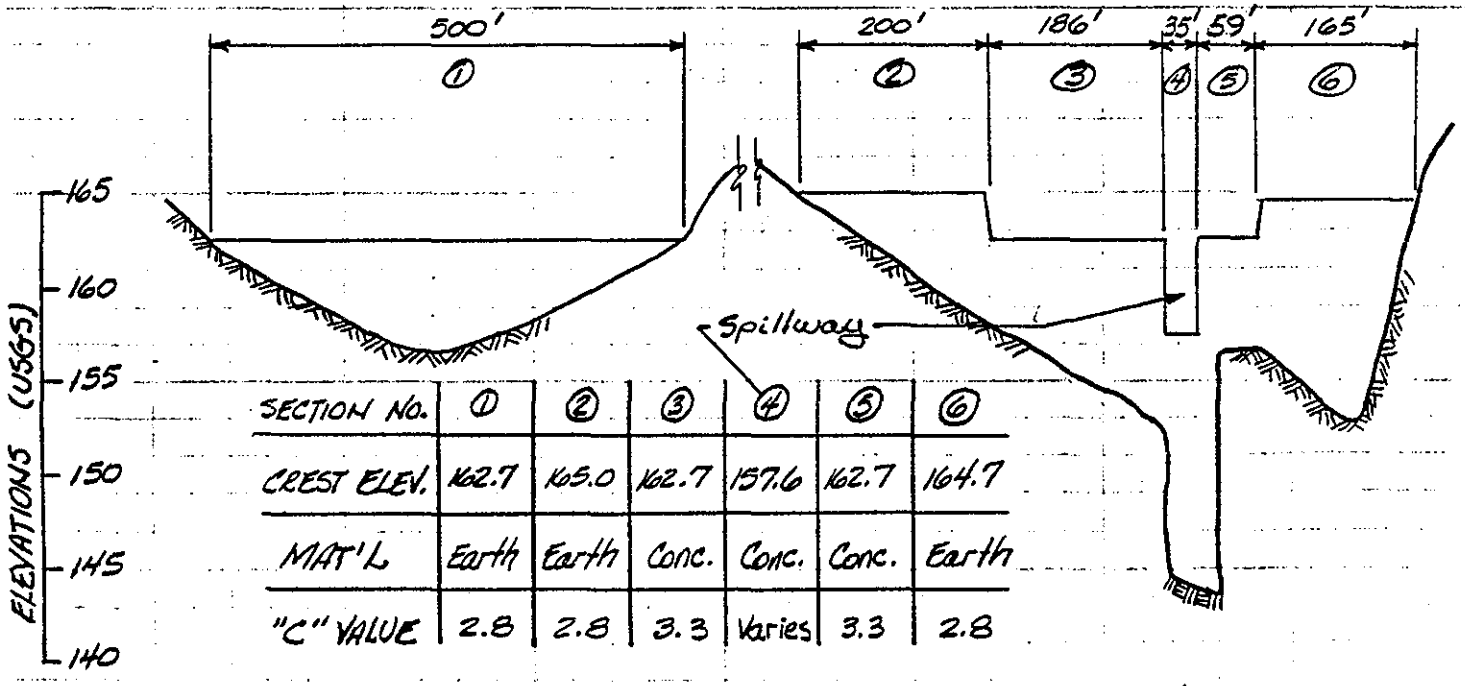
TEST FLOOD DETERMINATION

For an Intermediate size and Significant hazard, COE Guidelines give test flood range of 1/2 PMF to a full PMF (Probable Maximum Flood). Adopt 1/2 PMF for test flood as size of dam is at low end of classification range.

With the exception of approx. 8% of the watershed which drains Mt. Agamenticus, the 4.1 sq. mi. drainage area is typical of Flat & Coastal terrain.

then test flood inflow = $4.1\ mi^2 \times 850\ csm \times 1/2 = 1743$, say 1750 cfs

STAGE-DISCHARGE RELATIONSHIPS



SECTION NO.	①	②	③	④	⑤	⑥
CREST ELEV.	162.7	165.0	162.7	157.6	162.7	164.7
MAT'L	Earth	Earth	Conc.	Conc.	Conc.	Earth
"C" VALUE	2.8	2.8	3.3	Varies	3.3	2.8

ELEV. VIEW OF DAM AND DIKE LOOKING U/S

W.S. ELEV.	SECT. ① L = 500 ft. C = 2.8 Q_1 (cfs)	SECT. ② L = 200 ft. C = 2.8 Q_2 (cfs)	SECT. ③ & ⑤ L = 245 ft. C = 3.3 $Q_{3,5}$ (cfs)	SECT. ④: SPILLWAY 35 ft. Conc. Qgee "C"	SECT. ④: SPILLWAY 35 ft. Conc. Qgee Q_4 (cfs)	SECT. ⑥ L = 165 ft. C = 2.8 Q_6 (cfs)	TOTAL DISCHARGE Q_T (cfs)
157.6	-	-	-	-	0	-	
158.6	-	-	-	3.48	120	-	120
159.6	-	-	-	3.67	360	-	360
160.6	-	-	-	3.72	680	-	680
161.6	-	-	-	3.83	1,070	-	1,070
162.7	0	-	0	4.00	1,610	-	1,610
162.8	40	-	30	4.00	1,660	-	1,730
162.9	130	-	70	4.00	1,710	-	1,910
163.0	230	-	130	4.00	1,760	-	2,120

SURCHARGE - STORAGE ROUTING

Test Flood Inflow = 1750 cfs = Q_{P_1}

Surcharge Height to pass Q_{P_1} = 162.82

$STOR_1 = \frac{965 \text{ ac-ft} \times 12"/\text{ft}}{2590 \text{ acres}} = 4.47"$

$Q_{P_2} = Q_{P_1}\left(1 - \frac{STOR}{9.5'}\right) = 1750\left(1 - \frac{4.47}{9.5}\right) = 930 \text{ cfs}$

Surcharge Height to pass Q_{P_2} = 161.25

$STOR_2 = \frac{675 \text{ ac-ft} \times 12"/\text{ft}}{2590 \text{ ac.}} = 3.13"$

$STOR_{A_1} = \frac{3.13 + 4.47}{2} = 3.8"$

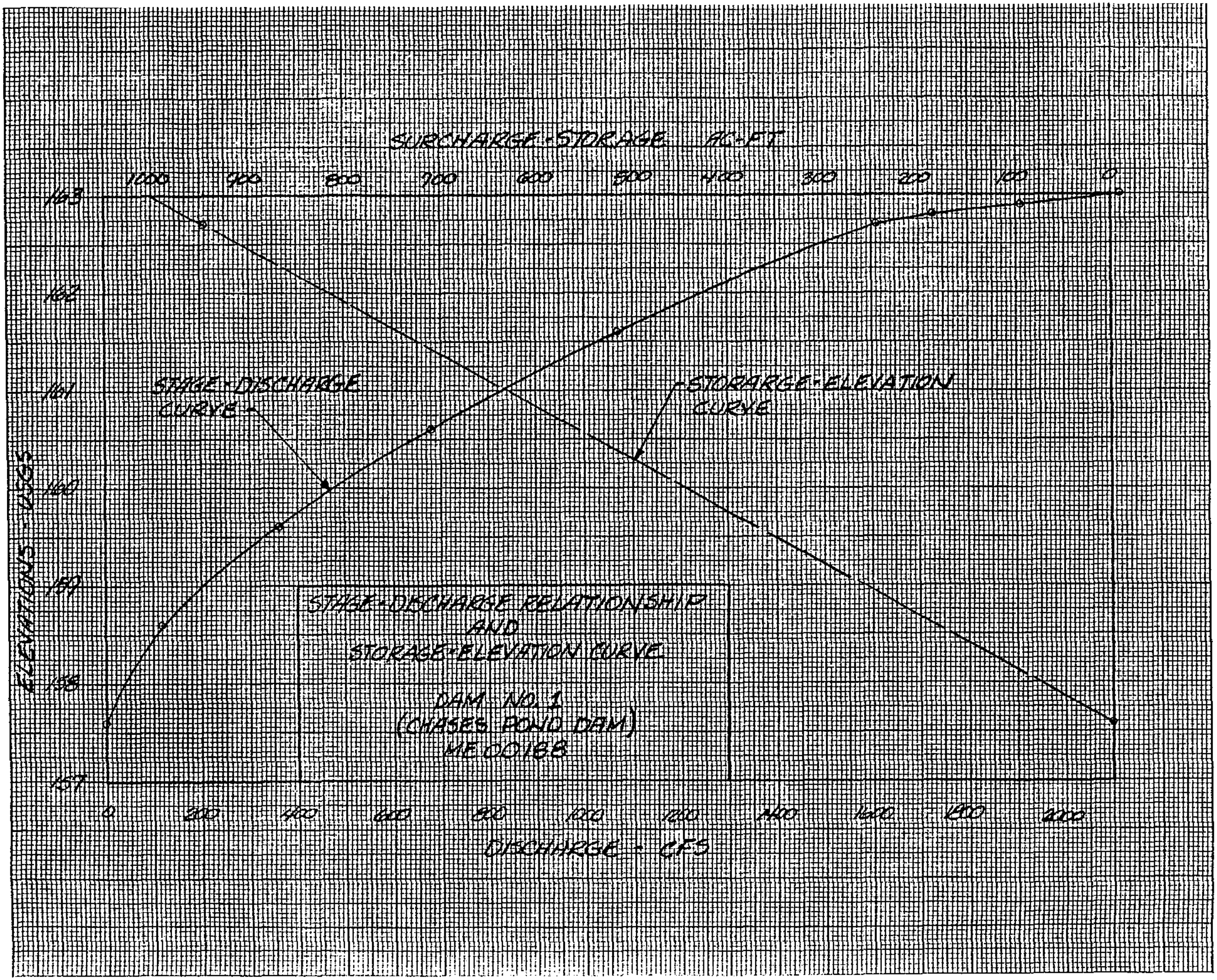
$Q_{P_3} = 1750\left(1 - 3.8/9.5\right) = 1{,}050 \text{ cfs}$

Surcharge Height to pass Q_{P_3} = 161.55

$STOR_3 = \frac{730 \text{ ac-ft} \times 12"/\text{ft}}{2590 \text{ ac}} = 3.38"$

$STOR_{A_2} = (3.38 + 3.80")/2 = 3.59"$

$Q_{P_4} = 1750\left(1 - 3.59/9.5\right) = 1{,}090 \text{ cfs}$; say 1,100 cfs @ El. 161.65



SURCHARGE - STORAGE AC-FT
1000
900
800
700
600
500
400
300
200
100
0
163
162
161
160
159
158
157
ELEVATIONS - USGS
STAGE - DISCHARGE CURVE
STORARGE - ELEVATION CURVE
STAGE - DISCHARGE RELATIONSHIP
AND
STORAGE - ELEVATION CURVE
DAM NO. 1
(CHASES POND DAM)
ME 00188
0
200
400
600
800
1000
1200
1400
1600
1800
2000
DISCHARGE - CFS

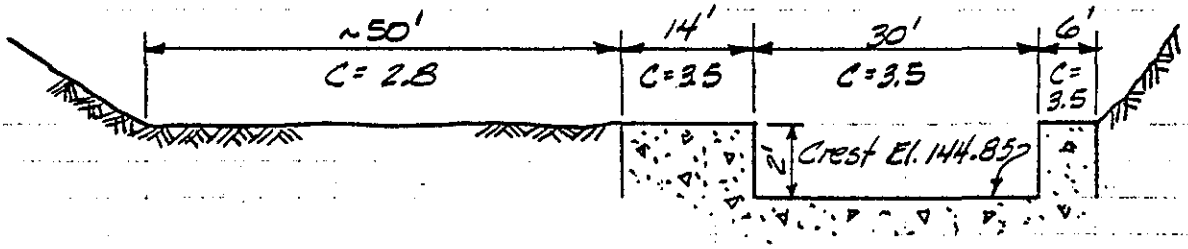
TAILWATER ANALYSIS

Spillway discharge at test flood = 1,100 cfs

D/S controls consist of:

- 15'W x 9.25'H Chases Pond Road Bridge located at the toe of the spillway
- Little Pond Dam located about 150' d/s of spillway

Little Pond Dam



ELEVATION VIEW LOOKING D/S

$Q = CLH^{3/2} = 3.5 \times 30 \times H^{3/2} + 3.5 \times 20 \times (H-2)^{3/2} + 2.8 \times 50 \times (H-2)^{3/2} = 1,100$

then $1,100 = 105\,H^{3/2} + 210\,(H-2)^{3/2} = Q$

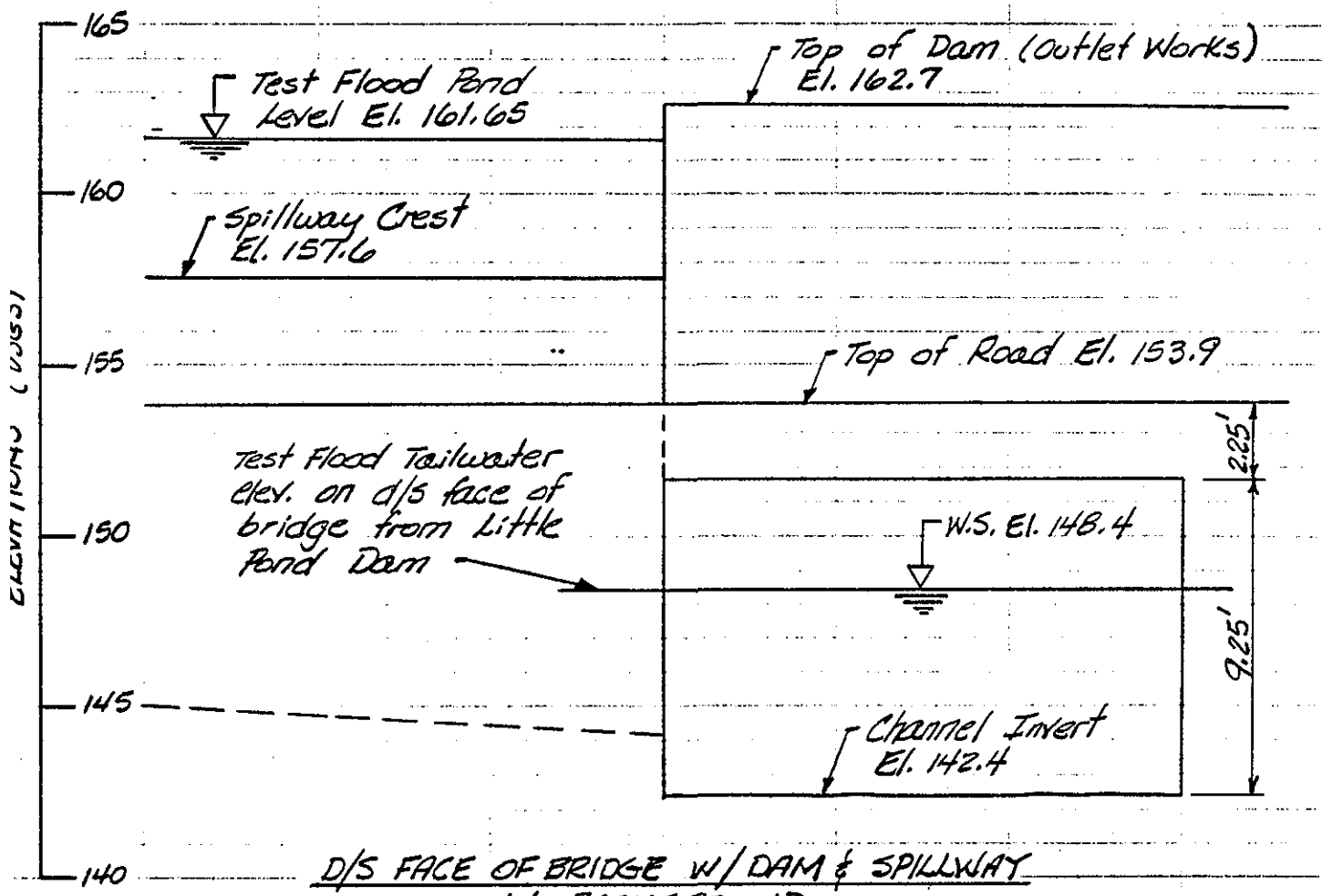
If $H = 3.5$ ft. $Q = 1,073$ cfs

$H = 3.6$ ft. $Q = 1,142$ cfs

At $Q = 1,100$ cfs, $H \simeq 3.55$ ft.

Then backwater elev. on d/s face of Chases Pond Road Bridge is El. 148.4

Chases Pond Road Bridge



D/S FACE OF BRIDGE W/ DAM & SPILLWAY IN BACKGROUND

Approx. W.S. Elev. at u/s face of bridge:

$Q = CA(2gh)^{1/2}$ where $A = 15' \times 9.25' = 138.75$ s.f.

h = u/s W.S. − 148.4

let $C = 0.6$ to account for all energy losses

$Q = 1{,}100$ cfs

then $1{,}100 = 0.6 \times 138.75\,(64.4)^{1/2}(h)^{1/2} = 668 \times h^{1/2}$

$h = (1100/668)^2 = 2.7$ ft.

∴ u/s W.S. = 148.4 + 2.7 = El. 151.1

say tailwater at toe of spillway El. 152.0

DAM FAILURE ANALYSIS

Inspection of the dam revealed that the most critical dam failure section in terms of d/s hazard would be the 165 ft. long earth dike located to the left of the spillway.

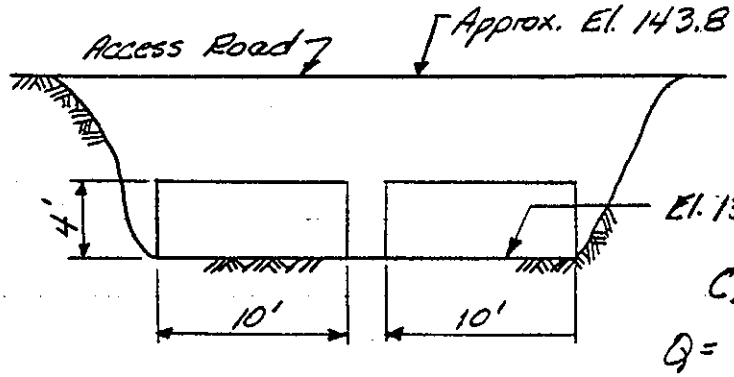
Approx. height (from plans) = 12 ft.
" length " " at mid-height = 140 ft.

$$Q_{P1} = 8/27 \sqrt{g}\, W_b\, Y_o^{3/2} = 8/27 \times (32.2)^{1/2} (0.4 \times 140)(12)^{3/2}$$
$$= 3{,}900 \text{ cfs}$$

This flow of nearly 4,000 cfs would impact on the Water Dept's Process Bld'g and flood over Chases Pond Rd. before joining the d/s channel. Opposite this failed section of the dam on the d/s side of Chases Pond Road is a residential home with sill elev. approx. 6 ft. lower than top of dam. Potential loss of life would be a few.

After overtopping Chases Pond Rd., the failure outflow would join the d/s channel at about the location of Little Pond Dam and combine with the 1,100 cfs spillway discharge. Total flow = 5,000 cfs

About 150 ft. d/s of Little Pond Dam is a gravel access road with a twin box culvert with invert about 10.5 ft. below crest of Little Pond Dam or El. 134.4



Effective Weir Length ≈ 100 ft.; $C_1 = 3.0$

Area = 10 × 4 × 2 = 80 s.f.

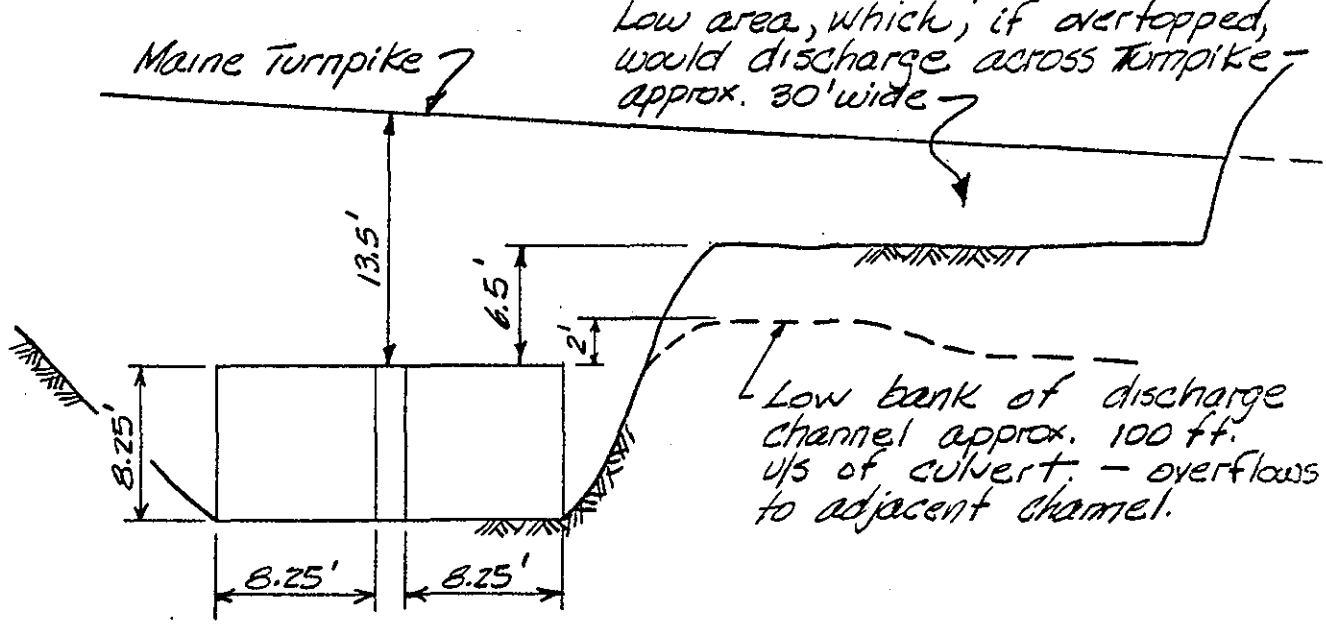
C_2 in orifice eq. = 0.7

$$Q = C_1 L H_1^{3/2} + C_2 A (2g H_2)^{1/2}$$

W.S. Elev.:	143.8	148.0	149.0
H_1 :	0	4.2'	5.2'
H_2 :	5.4'	9.6'	10.6'
Q :	1,050 cfs	3,970 cfs	5,020 cfs

The dam failure outflow would overtop the gravel access road by about 5 ft. No structures would be affected nor is there any apparent potential for loss of life.

Approx. 1,000 ft. d/s of above access road is a twin box culvert beneath the Maine Turnpike. About 100 ft. u/s of the Turnpike culvert the right channel bank is low and overflows would flow out of channel and into adjacent channel which is culverted under the Turnpike.



If water depth = elev. of 30' wide low area, $h = 4.1' + 6.5' = 10.6'$

$Q_1 = 0.7 \times (8.25 \times 8.25) 2 (2g\,10.6)^{1/2} = 2{,}490$ cfs

Q over right bank $\simeq 2.8 \times 200' \times (4.5)^{3/2} = 5{,}350$ cfs

$\therefore Q_T = 7{,}840$ cfs > dam failure flow of 5,000 cfs.

Therefore, Maine Turnpike will not be overtopped at this location.

Potential loss of life is a few (house immeadiately d/s of dam) and hazard classification is

SIGNIFICANT

APPENDIX E - INFORMATION AS CONTAINED IN THE NATIONAL INVENTORY OF DAMS